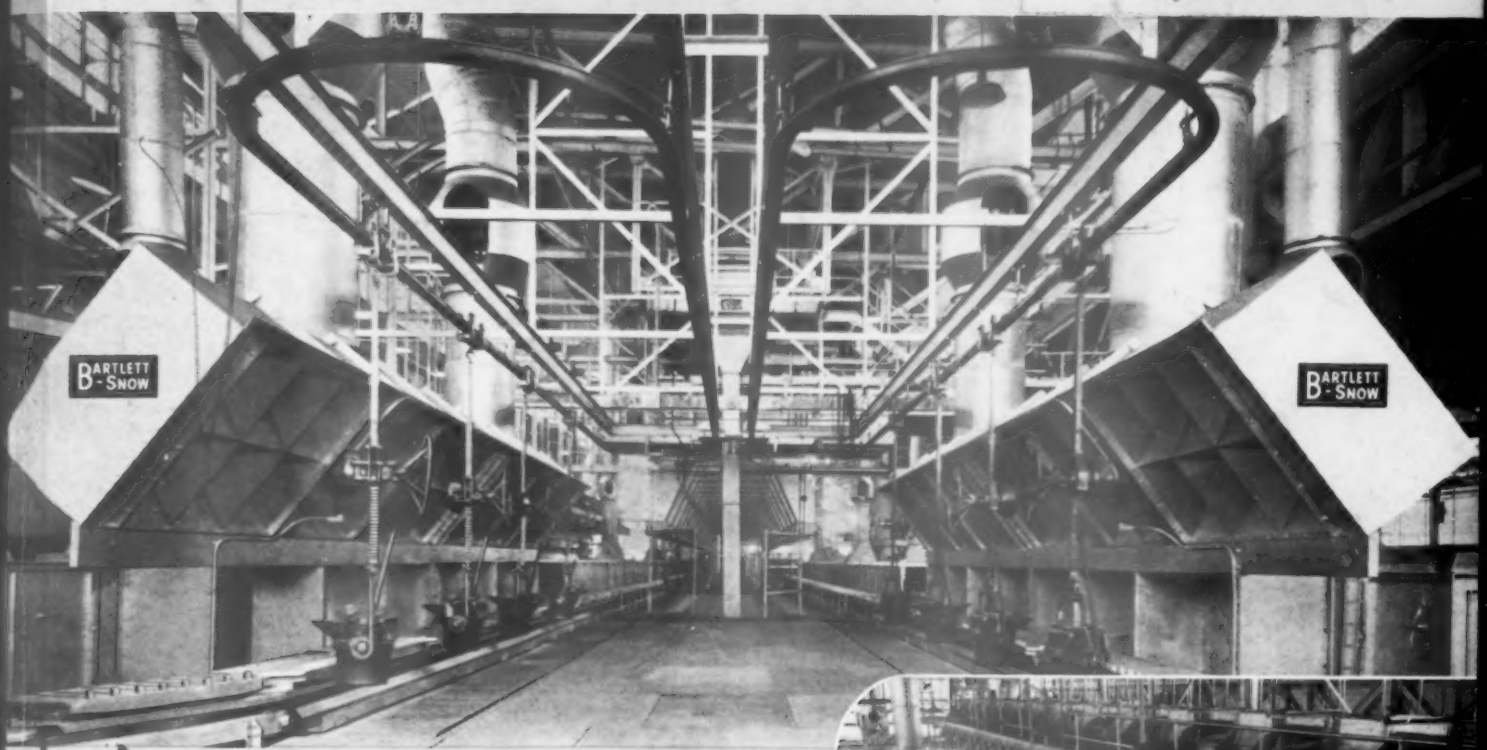
TECHNOLOGY DEPARTMENT

PRE-CONVENTION ISSUE May, 1949

# THE FOUNDRY

*wherever metals are cast...*

APR 27 1949




## Mechanize

CUPOLA CHARGING—POURING
SAND RETURN, PREPARATION AND DISTRIBUTION
FLASK FILLING, HANDLING AND SHAKEOUT
CASTINGS COOLING, CLEANING, INSPECTION

AND

## Control

LABOR APPLICATION
CASTING QUALITY
SCRAP LOSS
FOUNDRY COSTS

BARTLETT B-SNOW
CLEVELAND 5, OHIO

DESIGNING AND CONTRACTING ENGINEERS
*For the Foundry Industry*
SAND, MOLD AND CASTINGS HANDLING EQUIPMENT

# *from '28 to '48...* increasing consumption of PURITE verifies foundrymen's approval

Purite's remarkable action in desulphurizing and refining iron in the ladle or in the cupola hearth—its effect on combustion—and its action in smoothing out cupola melting operations are the reasons behind the ever-increasing use of Purite by progressive foundrymen everywhere. Their stepped-up demand for this scientific flux is the best testimonial they can give.

In addition to removing sulphur, Purite purges molten metal of occluded gases, entrained oxide-silicates and other non-metallic impurities that may cause pinholes, gas pockets or other defects. Refining with Purite increases strength ...improves grain structure and machinability... speeds production of cleaner, sounder castings.

In four principal casting centers in the North, South, East and Midwest the vast majority of foundries use Purite regularly. You'll want to know why so many foundries order and re-order Purite—so write for free factual information which tells how Purite helps them—and how it can help you in these competitive days. Mathieson Chemical Corporation, 60 East 42nd Street, New York 17, N. Y.

**Mathieson**
CHEMICALS

Purite (Fused Soda Ash) · Liquid Chlorine · Caustic Soda · Soda Ash
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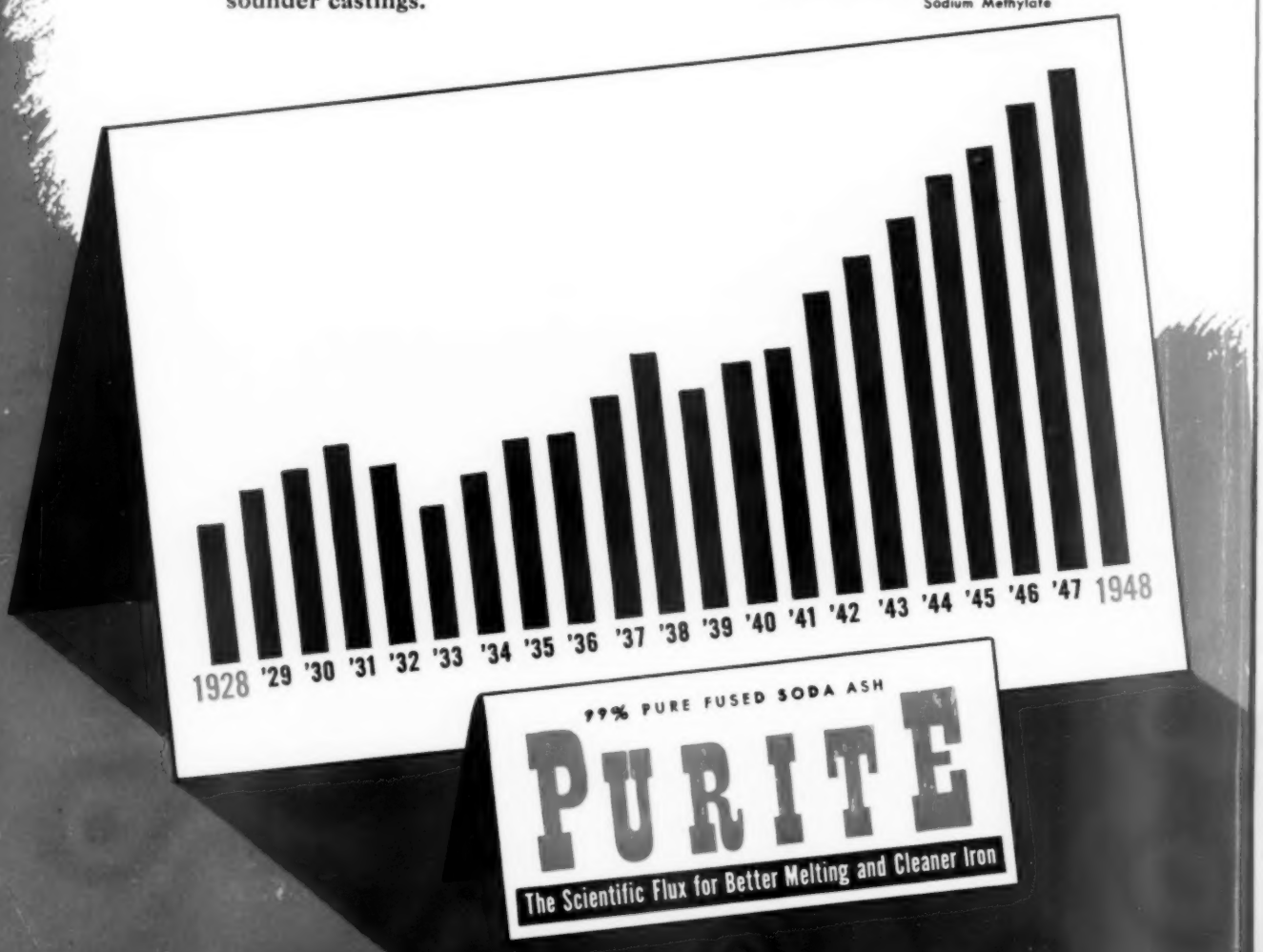
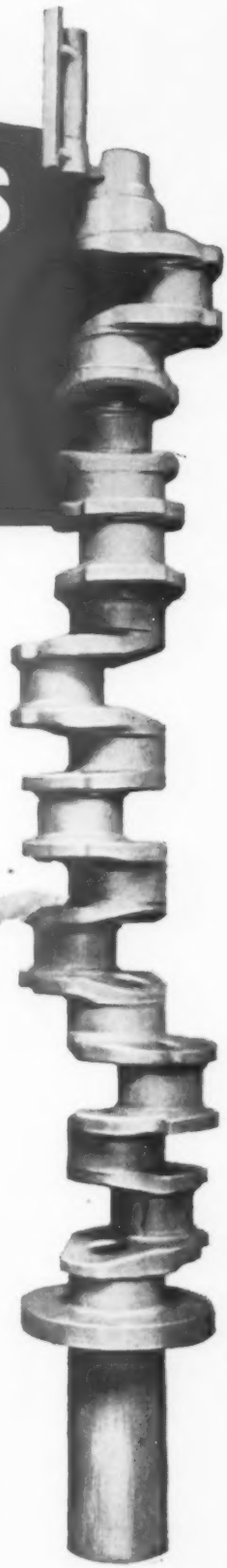
Products · Chlorine Dioxide · HTH Products · Dry Ice · Carbonic Gas
Sodium Methylate


1928 '29 '30 '31 '32 '33 '34 '35 '36 '37 '38 '39 '40 '41 '42 '43 '44 '45 '46 '47 1948
99% PURE FUSED SODA ASH
PURITE
The Scientific Flux for Better Melting and Cleaner Iron

# HEAVY DUTY CRANKSHAFTS
## *cast in High Test*
# NICKEL ALLOY IRON



Crankshafts ranging from 800 to 4000 pounds in weight, and from 6 to 18 feet in length . . . for large Diesel engines in marine, locomotive, and stationary power plants . . . are now produced commercially by Pacific Car & Foundry Company's efficient new casting method.

The photograph shows an unmachined 8-throw unit that weighs 2105 pounds. It was cast in high strength nickel-molybdenum gray iron at Pacific's foundry in Renton, Washington.

This nickel alloy iron, produced as an inoculated iron in the basic electric furnace, consistently meets strength specifications of 60,000 to 75,000 p.s.i.

Each shaft is stress-relief annealed, and x-rayed to detect possible internal defects.

These nickel-molybdenum cast iron crankshafts provide:

- **Low Notch Sensitivity**
- **Excellent Vibration Damping**
- **High Resistance to Fatigue**

Avoidance of expensive dies and forging equipment, the use of cores to eliminate unnecessary metal, and the fact that castings require less machine tool time . . . point to the economy of using nickel alloy irons.

Heavy duty crankshafts indicate the wide scope of applications for high strength nickel alloy cast irons. Our casting specialists will be glad to consult with you and suggest where nickel cast irons may be useful to you. Write us today.

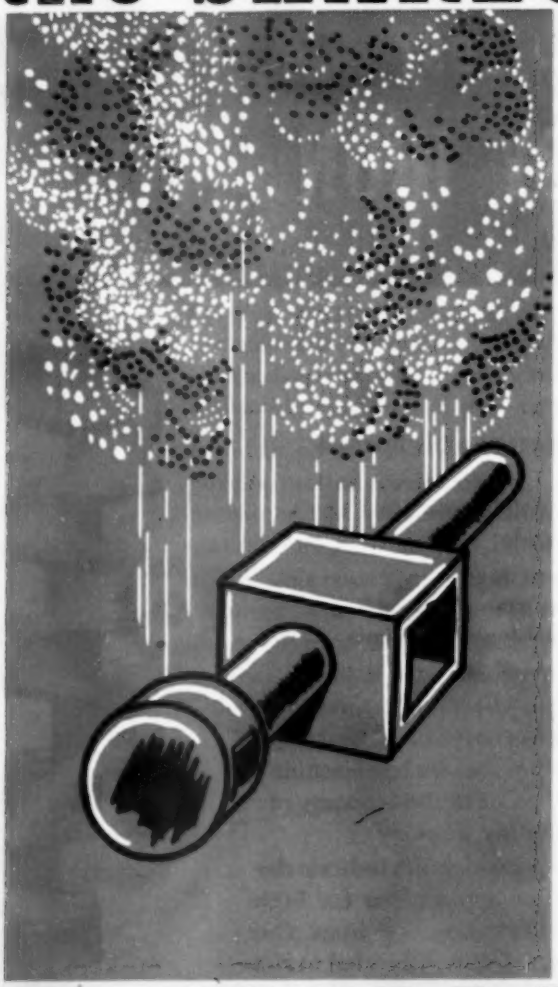
This high test nickel iron crankshaft is cast in a mold set horizontally, and tilted slightly while pouring. Mounted in specially designed trunions, the mold is rotated 90° to the vertical position for cooling. This provides better feeding, improved directional solidification, and thus, sound castings.

EMBLEM OF INCO SERVICE
TRADE MARK

Over the years, International Nickel has accumulated a fund of useful information on the properties, treatment, fabrication and performance of engineering alloy steels, stainless steels, cast irons, brasses, bronzes, nickel silver, cupro-nickel and other alloys containing nickel. This information is yours for the asking. Write for "List A" of available publications.

**THE INTERNATIONAL NICKEL COMPANY, INC.** 67 WALL STREET NEW YORK 5, N.Y.

# The Answer is Found In the SHAKEOUT . . .



All the things that go into the preparation of a casting—skill, experience, judgement, equipment, materials—are locked in the sand after the metal is poured. The sand, then, carries the greatest burden of responsibility. FEDERAL GREEN BOND imparts any desired strength to the sand, thus eliminating guesswork and insuring results. Foundrymen all over the country place their trust in GREEN BOND day after day, because the pay-off is revealed in the shakeout—cleaner castings, fewer rejects and consistently better work.

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*The Best of the Bentonites*

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MAY, 1949

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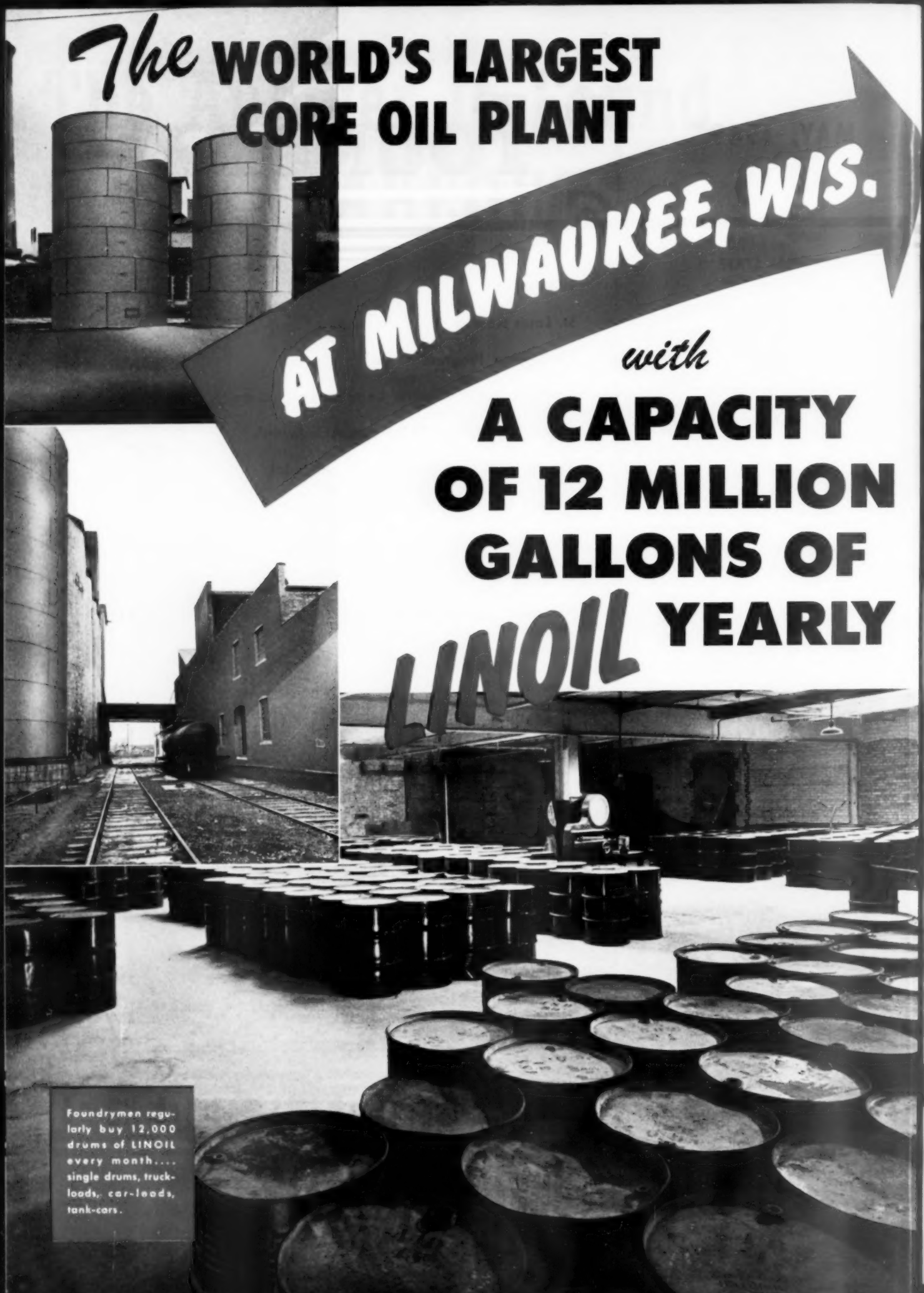
# *The* WORLD'S LARGEST CORE OIL PLANT

## AT MILWAUKEE, WIS.

*with*

## A CAPACITY OF 12 MILLION GALLONS OF LINOIL YEARLY



Foundrymen regularly buy 12,000 drums of LINOIL every month.... single drums, truck-loads, car-loads, tank-cars.

The new LINOIL plant at Milwaukee has been planned and located specifically for better serving the foundrymen of America....

...By establishing a manufacturing source right in the center of the vast foundry area reaching out from the Milwaukee, Chicago, and Tri-Cities districts, we are able to give quicker, smoother, and more economical service to foundries in that region—also westward to the Pacific Coast.

...By taking a considerable load off of the Cleveland plant, better service can be given to foundries located between the Eastern Seaboard and Cleveland.

...By placing a manufacturing source nearer the consumer, it is possible to pass on to the consumer savings resulting from decreased freight costs, reduced warehouse expenses, and bulk deliveries.

...By having two plants...Cleveland and Milwaukee...each capable of producing the LINOIL needs for the entire country, plus a third plant in Toronto supplying Canadian foundries...there isn't the slightest chance of any of our customers being forced to wait one unnecessary day for his core oil. Two sources of supply are a reality, now....both of them LINOIL.

**LINOIL benefits are measured in terms of lower costs....better service.... guaranteed service....and always the uniformly high LINOIL quality.**

★

THE LINOIL THE LOGICAL OIL

## THE WERNER G. SMITH COMPANY

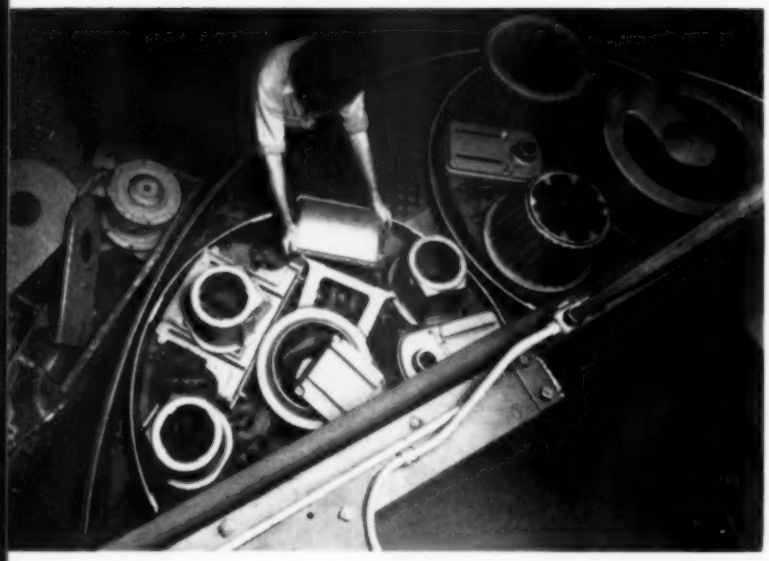
(DIVISION OF ARCHER-DANIELS-MIDLAND COMPANY)

2191 WEST 110th STREET · CLEVELAND 2, OHIO

1949

# Eight Years of ROTOBLAST*

HERE IS HOMER'S 14-foot diameter Rotoblast Table (Model LG-5). It teams up with two Rotoblast Barrels to boost casting production sky-high!



ALL SIZES OF CASTINGS are cleaned quickly and cheaply by the table. Loading and unloading are easy, assuring peak production at all times!

**Pangborn's** famous ROTOBLAST was developed to clean most effectively at lowest cost per hour of operation. It directs all the abrasive on a given target with the highest velocity for a given peripheral speed.

## CLEANS FASTER...

because it throws a greater volume of abrasive, covers a larger area with greater density, thus gets castings completely clean in less time than possible with older methods!

## CLEANS BETTER...

because it produces a cleaned surface of finer quality than was ever practical with older blast cleaning methods!

## CLEANS CHEAPER...

because it requires less horsepower to propel abrasive with velocity and quantity equal to *any other method!* Uses less manpower . . . minimizes maintenance . . . eliminates air compressor investments!

HERE IS PANGBORN'S 14 cubic foot Rotoblast Barrel in the Coldwater, Michigan, plant of Homer Furnace and Stove Co. Homer's highly skilled foundrymen have found that Pangborn Rotoblast cleans castings faster, better, cheaper than any other method!

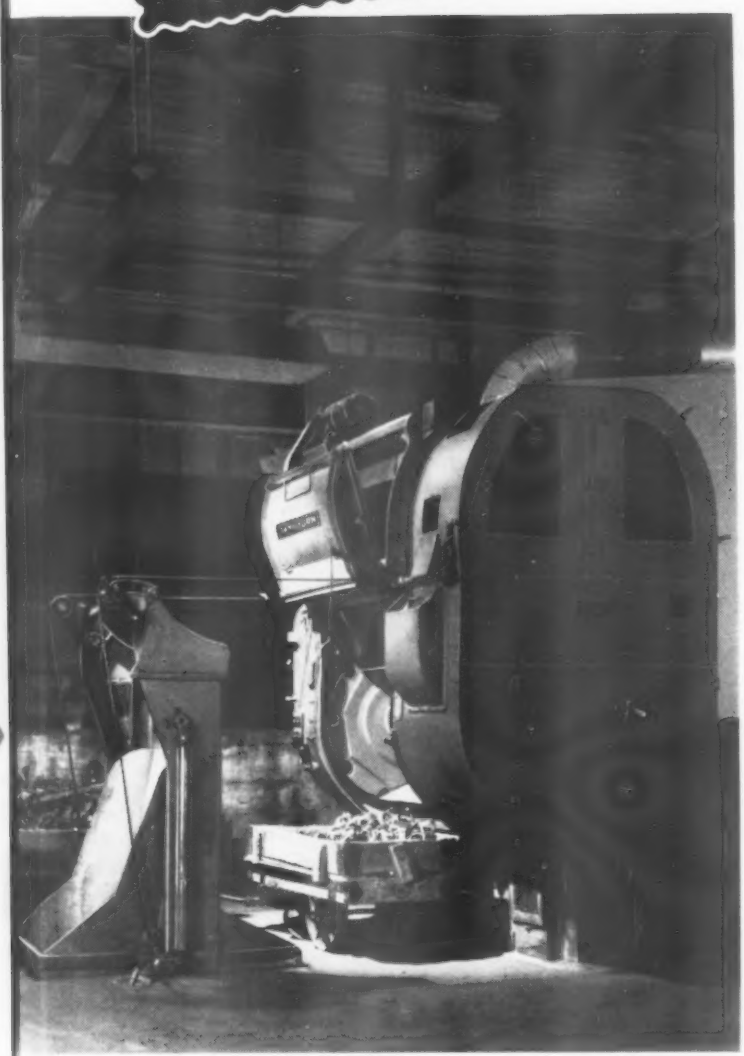
**MORE THAN 25,000 PANGBORN MACHINES SERVING INDUSTRY**

# Pangborn

* Trademark of Pangborn Corporation

# Continuous Use Proves *Cleans Faster, Better, Cheaper!*

## AT THE HOMER FURNACE AND STOVE CO.



EIGHT years of high volume production have proved that Pangborn ROTOBLAST Barrels blast clean faster, better, cheaper! Company officials report that *production soared* as soon as this 14 cubic foot ROTOBLAST Barrel was installed for the Homer Furnace and Stove Co., Coldwater, Michigan, in 1941! Blast cleaning costs were reduced to rock bottom . . . and castings were *completely cleaned,* even those with hard-to-reach "pockets"!

Two years later Homer added a 14 foot diameter Pangborn ROTOBLAST Table to their cleaning equipment. The ROTOBLAST table-and-barrel team drove production figures *even higher* . . . gave the company high-quality blast cleaning at low-cost on all their castings!

Pangborn ROTOBLAST *saves money* for hundreds of users like the Homer Furnace and Stove Company. Find out how it can do the same for you! For general details, read the story at the left . . . but for *specific information* fill in the handy coupon and mail today!

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Please send me free information on Pangborn ROTOBLAST.
I am interested in ☐ Barrels ☐ Tables ☐ Rooms

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COMPANY .....

ADDRESS .....

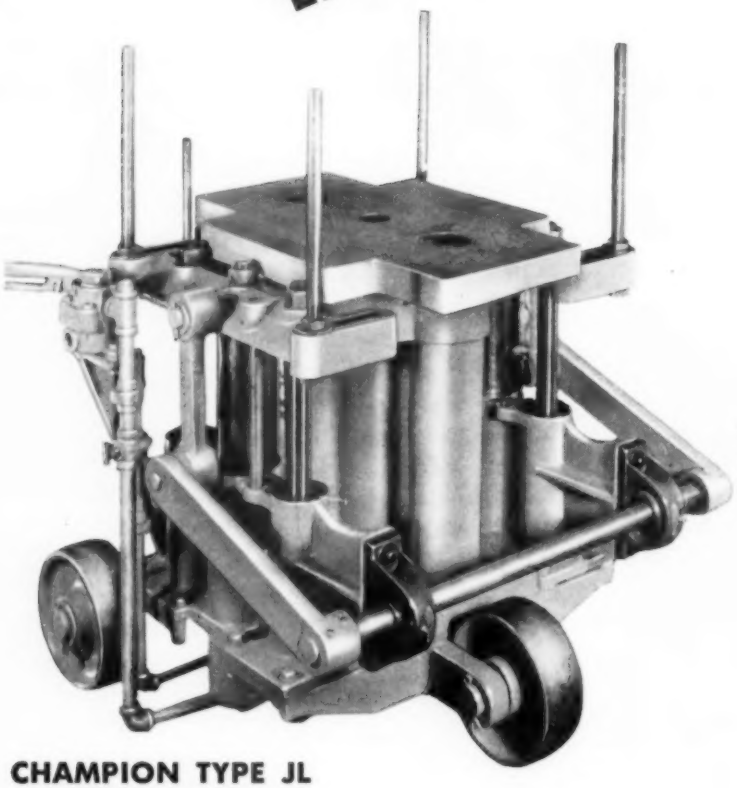
CITY ..... ZONE ..... STATE .....

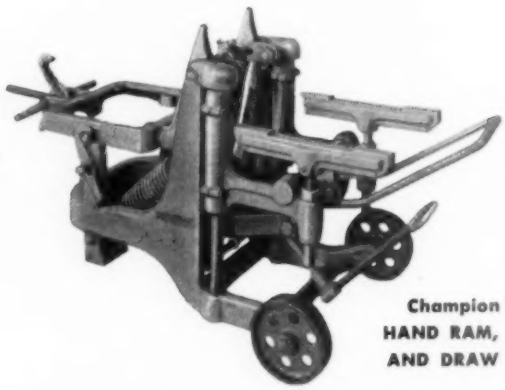
# BLAST CLEANS CHEAPER

**with the right equipment for every job**

SPEED
ACCURACY
EASY OPERATION

The





Champion Type W.
HAND RAM, ROLLOVER
AND DRAW MACHINE

## CHAMPION TYPE JL
## JOLT PIN LIFT

Accommodates flasks up to 30″ x 8″ draw.

Designed for perfect ramming, accurate draw, low maintenance, long life.

All guides and bushings in jolt and pin lift are hardened and ground steel.

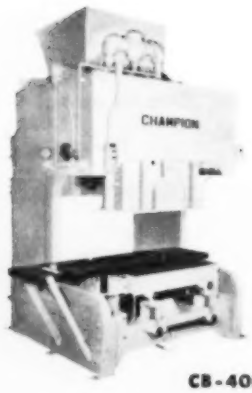
Equalizing mechanism is also fitted with hardened and ground pins and bushings.

Crank shaft operates in sealed dust proof ball bearings.

Champion Type JM
POWER JOLT, HAND
ROLLOVER AND
DRAW MACHINE

• • • •

## CHAMPION CORE BLOWERS

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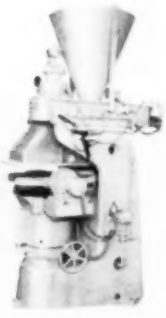


CB-15

CB-12

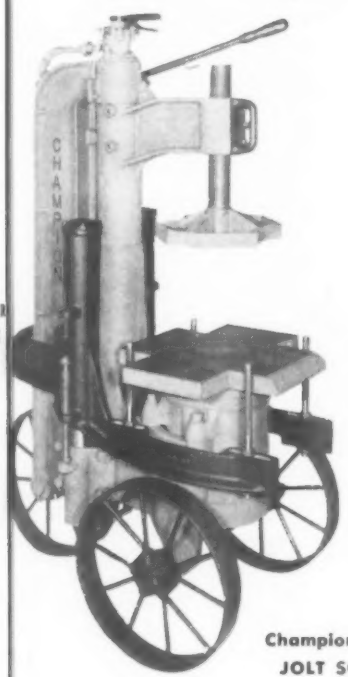
CB-10

CB-5

# "Ear-marks" of a Champion!

Takes more than one good trait to win the blue ribbon —and Champion molding machines and core blowers have earned high favor through their balance of speed, consistent accuracy and easy operation.

High quality castings that require minimum machining and produce less scrap are least costly in the long run. Champion molding machines and core blowers give you a long lead toward this goal.




**Champion Type JSL**
**JOLT SQUEEZE**
**PIN LIFT**

**Champion Type JS**
**PORTABLE**
**JOLT SQUEEZER**

**Champion Type JS**
**STATIONARY**
**JOLT SQUEEZER**

*Champion engineers and production specialists are glad at all times to give you the benefit of their long experience in helping you solve any mold or core making problems. Champion molding machines, jolt squeezers, rollover and draw machines have the high productive capacity, the precision and ease of operation that make the big difference in profitable production. There's a place in any up-to-date foundry for Champion equipment. Let us show you what these efficient machines can do for you.*

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Casilla 153 D, Santiago, Chile

Societa Torinese Adesivi Resine
Corso Moncalieri 414, Torina, Italy

August Ries, foreman of Victor Electric's rotor production, shown removing a "gate" of four rotors from the Model 400 Cleveland.

# Here's how to get relief from hot competition!

The rotors shown being cast above are used in 1/20 h.p. induction motors that power this 3-speed, 16" "Victron" Heavy Duty Oscillating Fan—one of the many fine electric ventilating, heating and appliance products designed and built by Victor Electric Products Inc. One of the "as-cast" rotors is shown below.

## Victor Electric Products Inc. builds a *better* motor, *faster*, at *less cost*, with the help of CLEVELAND Die Casting Machines...

By *die casting* rotors for fractional h.p. motors on Cleveland Die Casting Machines, Victor Electric Products Inc., Cincinnati, have by-passed many costly steps in their motor fabricating line; have increased production more than 300%; are able to maintain the *uniform excellence* of product construction that is Victor Electric's stock-in-trade.

With their two Model 400 Clevelands, Victor Electric makes rotor production a *breeze*. Stamped rotor laminations are weighed, stacked, pressed on splined shafts and inserted in a four-cavity die in the Cleveland machine. 99.5% pure aluminum is injected into the die and through the lamination perforations to form the rotor conductor bars and end rings.

Production averages 55 perfect shots per hour. *Only 25%* of the total output require corrective drilling to be in dynamic balance! The Cleveland-cast rotor is high in conductivity; has minimum porosity; is indestructible in operation. Considerable time is saved; metal and labor costs are way down; a *better* product results.

Are *you* considering new die casting machinery—or *changing* to die casting? If so, why don't you profit from the experience of many manufacturers and consider Clevelands *first?* For machine specifications, write now for bulletins.

**THE CLEVELAND AUTOMATIC MACHINE COMPANY**

**4926 Beech Street**
**Cincinnati 12, Ohio**

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Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines

Bailey

# PIG CASTING MACHINES

**For Open Hearth or Electric Furnaces — and Foundries**

**Metal cast direct from furnace**

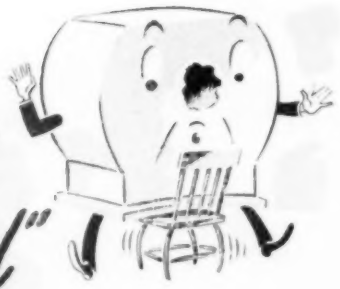
**Cold pigs as delivered from machine**

## *REDUCES LABOR COSTS .... LONGER LIFE,*

*because the Bailey Stationary Wheel design has fewer moving parts!*

WILLIAM M. Bailey COMPANY
ENGINEERS
LEADERSHIP THROUGH QUALITY
1221 BANKSVILLE BLVD. PITTSBURGH 16, PA.

# Let's "Kick it Around"



By TOM BARLOW

*"The time has come," the weary "super" said,*
*"To talk of many kinds of foundry cares;*
*Of shrinks and blows and Monday morning woes,*
*Of very heavy men and spindly chairs."*
—Apologies to everybody

The other day I got in the middle of an age-old argument in spite of my feeble attempts to find the nearest exit. The "super" said, "Tom, we want you to settle an argument. Is this a shrink or a blow?" It reminded me of the old riddle, "When is a shrink not a shrink?" and the answer, "When it's a blow."

Why do we yield to the human tendency to define every defect as *either-or?* We know darn well that most troubles are caused by a combination of circumstances. Even the A.F.S. "Defective Committee," as it used to be affectionately known by the members, finally gave up trying to define a "combination shrink-blow." Everybody assumed that it was just some poor peddler's attempt to straddle the fence. After four years' work, the Committee withdrew the defect because some one defined a combination shrink-blow as "a blowhole that some nut says is a shrink."

We all like to simplify a problem in order to nail it down, but in the foundry business life really isn't that simple. It is hard to change one variable without affecting a number of others. For example, I know of one foundry which developed an epidemic of blows by buying a new compressor. The new equipment delivered about twice the pressure to the squeeze machines. The extra squeeze caused blowholes all over the shop. Maybe that sounds silly, but it took "umpteen" experts to run it down. *The first problem is to find out where to look.*

Getting back to the question of shrinks versus blows, there are situations when it's hard to place the blame. If a 200-pound man sits in a 200-year old chair and the chair breaks, did it break because it was too weak or because the man was too heavy? Let the chair represent the metal section which has partially solidified and the man represent the gas pressure evolved by the mold. Now we find a hole in the casting where the "chair" was the weakest, the last section to solidify. Should we reduce the "man" or strengthen the "chair"?

The best answer is the easy answer. *Which can be changed cheapest and fastest?* Gas pressure can be reduced by changing to lower moisture, lower carbon or lower flour. Some help is obtained from bond clay with maximum permeability, such as Dixie. But—how will these changes affect the rest of the shop?

Metal resistance can be changed by larger risers, higher copes, "stiffer" iron, relocation of gates or, in exceptional cases, internal or external chills. In many cases the problem is to decide which of many cures is the most economical.

Low carbon, high silicon iron shrinks too easily, but what if that is the iron the customer specifies? We admit that high phosphorus in complicated castings probably causes more shrinks than any other one factor — but *suppose we can't buy "low phos" iron and scrap!* Changing from 60 permeability to 100 "perm" would lick the job, but what about the finish our pet customer demands?

In addition to the usual and sufficiently difficult problems, we also have occasional defects shown on the scrap sheet as A.O.G. (Acts of God) or G.O.K. (God only knows). For example, did you ever have "Monday morning shrinks"? Once upon a time we had a little job with four deep pockets that shrank every Monday morning. Every possible gate change was tried. Grown men wept many bitter tears before we found the answer. Here it was:

The heaps were wet down extra heavy on Friday night because they were not used until Monday. On Monday they were still wet, but only the one pattern ever gave real trouble. We finally built vent rods onto the squeeze board so that one vent would go into each deep pocket (a heavy boss was in the pocket) and the Monday morning shrink stopped — never to darken our lives again.... The defect came only in the four heavy bosses. It always looked like a shrink and technically it was a shrink. It always came on Monday. It was cured by four vent wires. *Was the "man" too heavy, or was the "chair" too weak?*

★ ★ ★

EASTERN CLAY PRODUCTS, Inc.

*"Bonding clays sold with service"*

JACKSON, OHIO

Norm Dunbeck and Tom Barlow would appreciate knowing how much value you find in these informal talks on foundry practice. Please take off the kid gloves and tell us exactly what you think.

**DIXIE BOND • BLACK HILLS BENTONITE • REVIVO BOND • REVIVO SUPER BOND • BALANCED REVIVO**

*– ECP PRODUCTS ARE SOLD WITH SERVICE THAT MEANS SOMETHING –*

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# Do You Melt Any of These?

## WITH ALL THESE METALS AJAX-NORTHRUP MELTING HAS PROVEN THE MOST ECONOMICAL METHOD

SINCE 1916

AJAX NORTHRUP HEATING & MELTING

Yes, in furnaces ranging from 8 oz. to 8 tons, Ajax-Northrup high frequency melting has proven to be the most economical method—on metal after metal.

Here's why: Its speed means no time for oxidation, and negligible loss of constituents. No carbon to contaminate—it's coreless induction melting. It stirs as it melts, producing "homogenized" alloys. Most important—it hits the most exacting melts right on the nose time after time. Interested? Just write Ajax for prompt facts.

AJAX ELECTROTHERMIC CORPORATION
AJAX PARK, TRENTON 5, N. J.
*Associate Companies*
THE AJAX METAL COMPANY • AJAX ELECTRIC FURNACE CORPORATION
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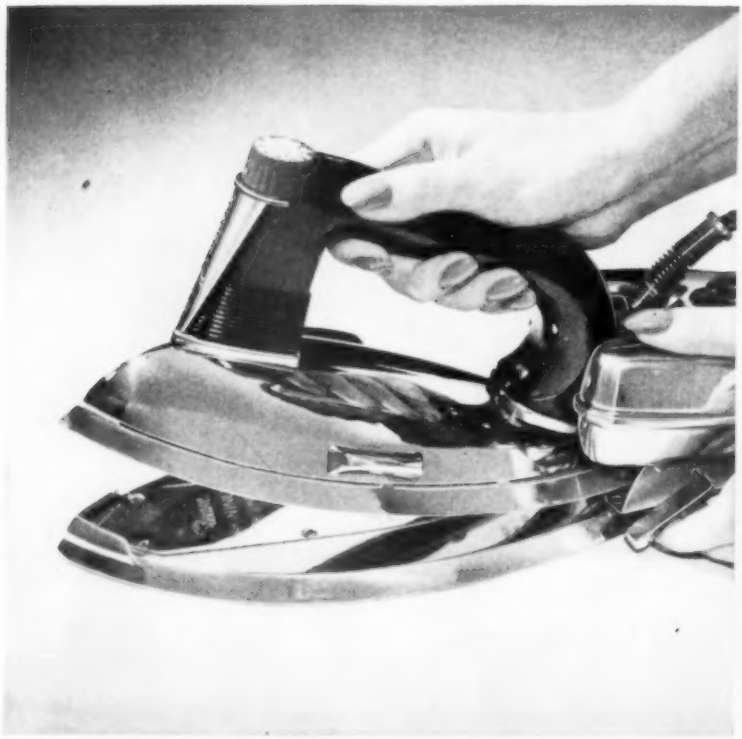
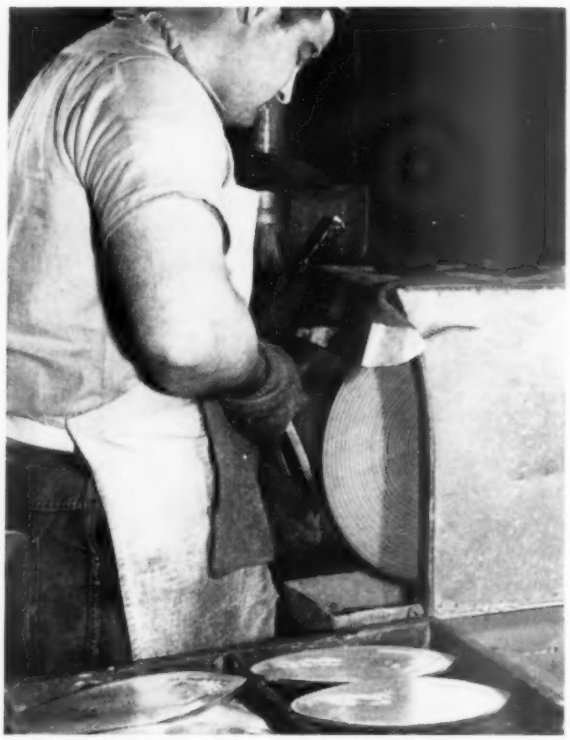
ANOTHER 3M COMPANY SERVICE STORY



**THIS NEW STEAM** *Ironing Attachment by General Mills instantly converts regular Tru-Heat Iron into handy steam iron. Big demand puts premium on speedy production.*



**3M BELTS** *finish the cast aluminum sole plates for the Steam Ironing Attachment faster and cheaper than the conventional method previously used.*

# Belt Grinding licks "Loading", speeds soleplate output for General Mills

Cast aluminum particles "loaded" the previous abrasive equipment used to finish cast aluminum soleplates. Frequent resurfacing was necessary, and much time was lost by operators in the process. Then General Mills tried belt grinding. Results were immediate . . . belts turned out smoother finishes and stepped up production.

3M BELT GRINDING is a fast, tested method for putting smoother finishes on nearly any surface—metals, glass or plastics—done by a continuous abrasive belt running over a contact wheel especially designed for your particular type of job.

3M NEW METHODS ENGINEERING SERVICE is ready to help you analyze your operations—supervise belt grinding installations—and give you regular inspection service—*all at no cost to you.* Ask us for complete information. There's no obligation, of course.

**The attached coupon** is your invitation for a 3M Methods Engineer to analyze your grinding or finishing operations. No obligation, of course.

Please send me a copy of your "Step Up Production" booklet. ☐

Please send a 3M Methods Engineer to call on us. ☐

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F-549

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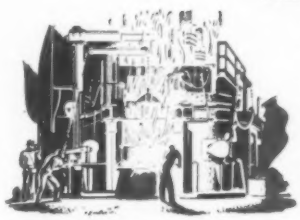
# How ELECTROMET serves the Steel Industry

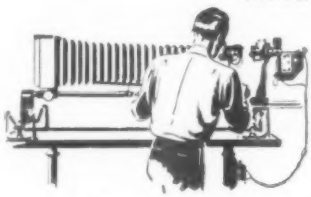
TRADE-MARK

### FIELD METALLURGISTS



You can obtain the help of our trained metallurgists who render on-the-job assistance in the use of ferro-alloys. These men are qualified to suggest the grades and sizes of alloys best suited for your particular steel and practice.

### LABORATORY RESEARCH



You can benefit by the new alloys developed by our continuous laboratory research. Developments from this research include the low-carbon ferro-alloys, silicomanganese, SILCAZ alloy, calcium metal, calcium-silicon, and ferrocolumbium.

### CONVENIENT FACILITIES

You can count on prompt and efficient service from ELECTROMET, since our offices, plants and warehouses are conveniently located to serve you.

### TECHNICAL BOOKLETS

You will find helpful information about ferro-alloys and metals in ELECTROMET'S free technical booklets and reprints. Among these is "ELECTROMET Products and Service." Write to our Technical Service Department for a copy.

### CHROMIUM

Low-Carbon Ferrochrome (in all grades from 0.03% maximum to 2.00% maximum Carbon), Nitrogen-Bearing Low-Carbon Ferrochrome, High-Carbon Ferrochrome, SM Ferrochrome, Chromium Metal, CMSZ Mix, and other Chromium Alloys.

### VANADIUM

Ferrovanadium in all grades, Vanadium Oxide, and Ammonium Metavanadate.

### COLUMBIUM

Ferrocolumbium.

### MANGANESE

Standard Ferromanganese, Low-Carbon and Medium-Carbon Ferromanganese, Low-Iron Ferromanganese, Manganese Metal, and other Manganese Alloys.

### SILICOMANGANESE

Max. 1.50 and 2.00% Carbon Grades.

### TUNGSTEN

Ferrotungsten, Tungsten Powder, and Calcium Tungstate Nuggets.

### BORON

Ferroboron, Manganese-Boron, Nickel-Boron, and SILCAZ Alloy.

### SILICON

Ferrosilicon in all grades including both regular and low-aluminum material, Silicon Metal, SMZ Alloy, and other Silicon Alloys.

### TITANIUM

Silicon-Titanium and Manganese-Nickel-Titanium.

### CALCIUM

Calcium-Silicon, Calcium-Manganese-Silicon, and Calcium Metal.

### "EM" BRIQUETS

Silicon, Silicomanganese, Ferromanganese, and Chromium Briquets.

### ZIRCONIUM

12-15%, and 35-40% Zirconium Alloys, and Nickel-Zirconium.

"CMSZ," "Electromet," "EM," "Silcaz," "SM," and "SMZ" are trade-marks of Union Carbide and Carbon Corporation.

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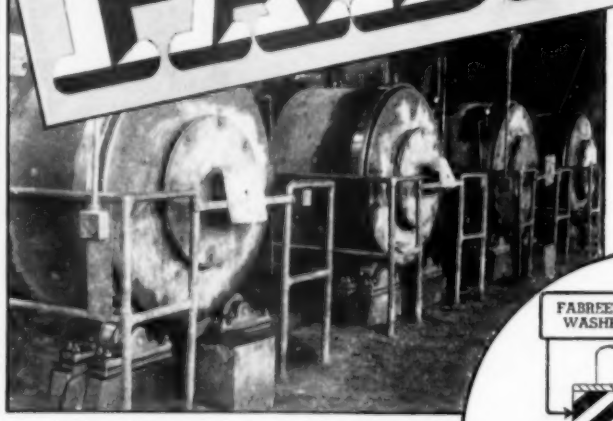
Ferro-Alloys and Metals

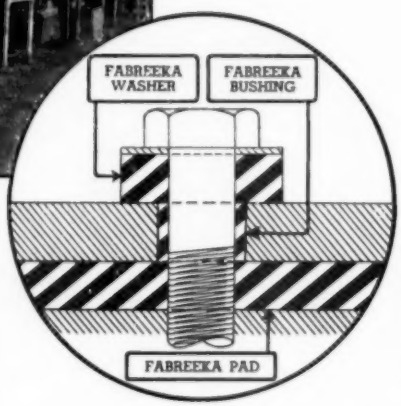
*Under All Heavy Machinery*

# FABREEKA

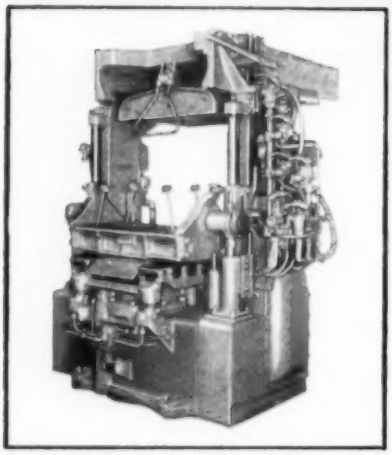
**PADS, BUSHINGS, and WASHERS**

**Absorb Impact Shock and Reduce the Effect of Destructive Vibration**



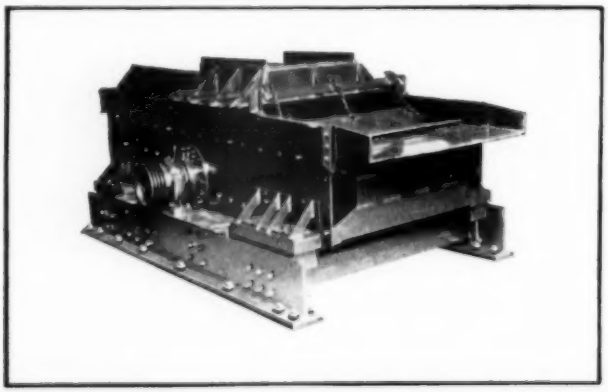



SHOWN AT LEFT
CROSS SECTION OF
FABREEKA INSTALLATION



**FABREEKA** Pads, bushings, and washers are installed under Shakeout Machines, Jolt Moulders, Tumbling Barrels and other heavy machinery to reduce the effects of heavy impact shocks and destructive vibration.

**FABREEKA** has demonstrated its ability to prevent breakage of machine parts and to keep bolts tight, thereby reducing maintenance and increasing production. In addition to these important advantages, Fabreeka has long life, which makes its final cost a low cost.



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*It Pays To Specify Fabreeka*

**FABREEKA PRODUCTS COMPANY, INCORPORATED**
222B Summer Street
Boston 10, Mass.

**for IMPACT SHOCK and VIBRATION**

*One of ten self-contained H-P-M all-hydraulic die casting machines installed at The Hoover Co., North Canton, Ohio.*

# For precision parts *Quick*.. use modern *die casting* equipment by H-P-M

Are you looking for a way to make your product better, lighter—at lower cost?

Here's a way to do it—switch to die casting! H-P-M die casting machines are doing a spectacular job at Hoover, Western Electric, Westinghouse, General Electric and at many other metal working plants. Why not take a tip from these leaders of industry?

Here's what H-P-M die casting machines will do for you . . . . they will eliminate costly machining and finishing operations . . . . production will be increased many times over your present methods . . . . you will have greater freedom in part design . . . . less investment in capital equipment.

An H-P-M engineer will be glad to analyze your production for die casting. He may save you real money. Write today.

*Write for a free copy of "Modern Die Casting Practice"—an authoritative article on the subject.*

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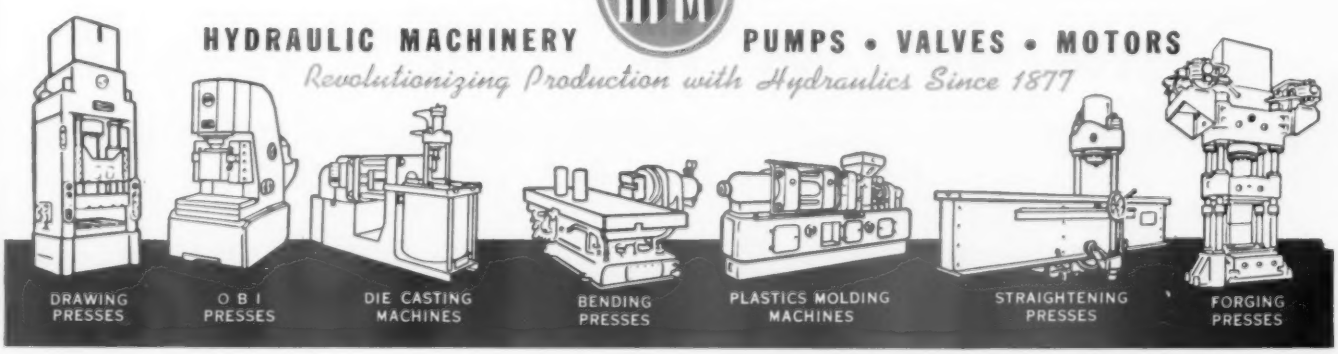
HPM

**HYDRAULIC MACHINERY** **PUMPS • VALVES • MOTORS**

*Revolutionizing Production with Hydraulics Since 1877*



# LARGEST STOCKS IN THE EAST OF FOUNDRY SUPPLIES AND EQUIPMENT

We proudly and sincerely state that we carry everything for the foundry and have built an enviable record for service even through the difficult years of scarcities. We are now in a better position than ever before to fill your orders with dispatch and a phone call, wire or letter will place any supplies or equipment on your foundry floor quicker than you ever thought possible.

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**FROM THE SMALLEST ITEM OF CHAPLETS, TO THE LARGEST ITEM OF EQUIPMENT—ASK US ABOUT IT**

**PENNSYLVANIA FOUNDRY SUPPLY & SAND CO.**
**ASHLAND & EAST LEWIS STREETS**
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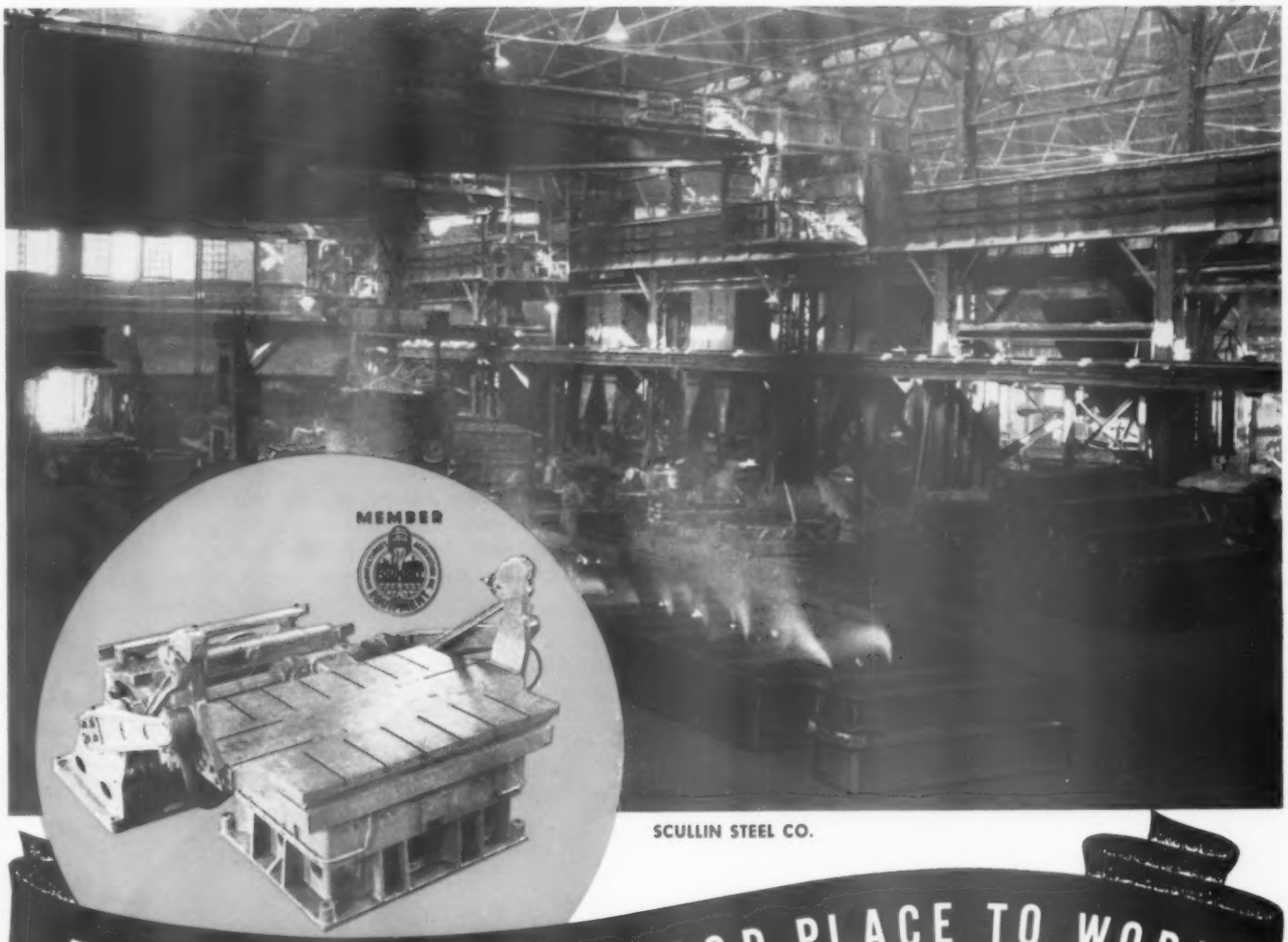



SCULLIN STEEL CO.

# THIS FOUNDRY IS A GOOD PLACE TO WORK

LOCATED in St. Louis, this foundry occupies a 100-acre site with complete, modern production facilities for railroad specialty and industrial castings . . . side frames, bolsters, coupler yokes, housings, gears, and many others in great variety.

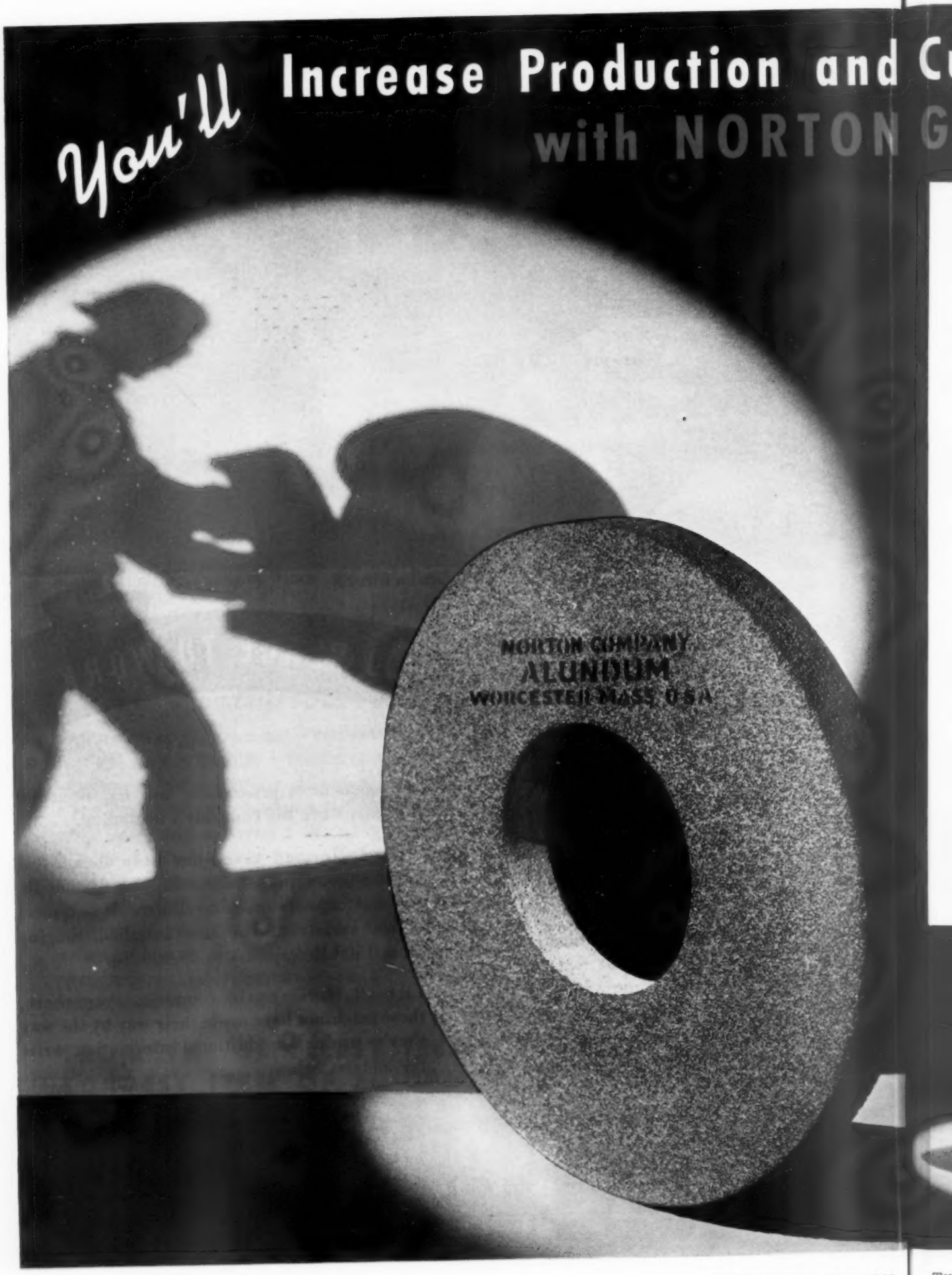
Melting is done in completely automatic open hearths. Wide open bays permit fast, efficient pouring, using overhead cranes. Modern heat treating furnaces improve physical properties. X-Ray facilities are available. Good housekeeping is a must in all divisions of the plant. Management is progressive and has been for 50 years since the company's beginning.

Several Herman machines help make this plant a good place to work. The 10,000 lb. rollover capacity machine illustrated is typical of the variety of Hermans installed, ranging from 1500 lb. capacity to 20,000 lbs.

Like all Hermans, in foundries everywhere, these machines have made their way by the way they're made. For additional information, write the address below.

Herman **MOLDING MACHINES**

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.


You'll Increase Production and C
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NORTON COMPANY
ALUNDUM
WORCESTER MASS U.S.A.

# d Cut Grinding Costs
# N Grinding Wheels

## Because - -

### They Contain Abrasives that Cut Fast and Smooth

With fast-cutting Norton wheels of tough, sharp ALUNDUM abrasive—available in several different types—you can grind castings of steel, manganese steel, annealed malleable iron, or bronze, quickly and at lowest possible cost. For the low cost grinding of castings of gray iron, unannealed malleable iron, or nonferrous metals, there are Norton wheels of hard, sharp CRYSTOLON abrasive.

### And Bonds which Aid Cutting Action and Insure Long Life

Outstanding for your high speed operations are special Norton B-5 and B-7 resinoid bonds. And vitrified bonded wheels give equally low cost operation where the speed does not exceed 6500 s.f.p.m. Norton wheels are also available with rubber or shellac bond for jobs requiring thin wheels and good finish, and for handling aluminum castings.

There's a Norton wheel with just the right combination of abrasive and bond to increase production and to cut costs on each of your foundry grinding jobs. Your Norton abrasive engineer or distributor will be glad to furnish specifications and further details.

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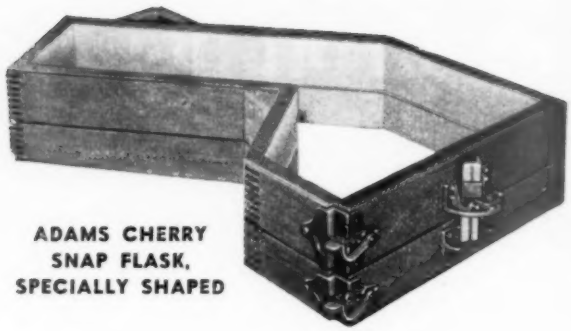
ADAMS ALUMINUM
SLIP FLASK



ADAMS CHERRY
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SPECIALLY SHAPED

*Any Shape—Any Size*

## FLASKS OR FLASK EQUIPMENT

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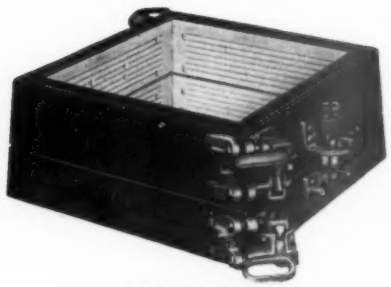
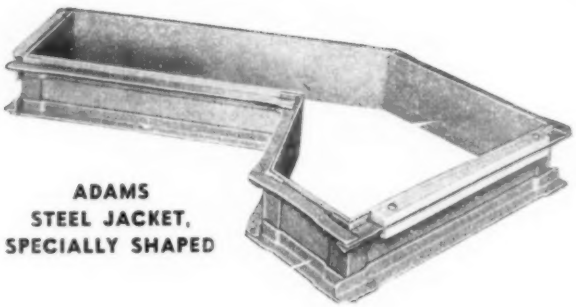
## To Your Exact Specifications



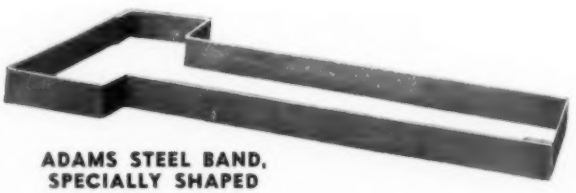
ADAMS CHERRY
EASY-OFF FLASK

Whatever style, size or shape you need, Adams custom made Flasks and Flask Equipment are built to your order, with any desired length, width or depth, by men who *know* foundry requirements. And when they are *Adams-Built*, they assure more efficient performance, longer life and faster production. They are designed to maintain peak production of high-quality castings, reduce rejects, lower production costs. It is hard to surpass Adams Flasks for accuracy, convenience and economy. Write for complete information today.



ADAMS
STEEL JACKET,
SPECIALLY SHAPED

ADAMS ALUMINUM UPSET



ADAMS STEEL BAND,
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**THE ADAMS COMPANY**
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# The ADAMS Company

ESTABLISHED 1883

MOLDING MACHINES and FLASK EQUIPMENT

DUBUQUE, IOWA, U.S.A.

# CONE WHEEL SMOOTHS OUT DIE MARKS 200% FASTER

IN grinding die marks from the inside of pressure tanks, this manufacturer was using straight type 4500 R.P.M. grinders with 6″ x 2″ x ⅜″ vitrified wheels. The wheels cut grooves into the tank on either side of the die marks, causing failures under test.

When called in, the Rotor Application Engineer recommended 8500 R.P.M. Rotor Air Grinders with 2¼″ x 3½″ x ⅜″ resinoid bond cone wheel, round nose. Result:

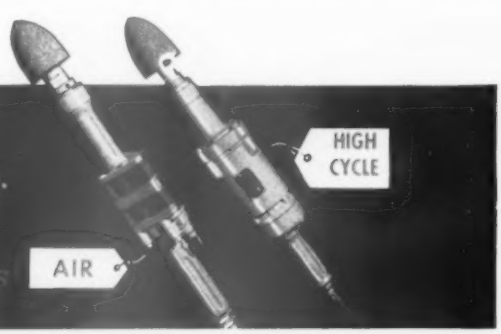
*Output increased 200%* because the round nose cone wheel could be held on the die marks without cutting into the tank wall . . . and because of the faster cutting of the resinoid wheel and the higher speed.

*Now the inspector says, "OK," every time.*

How about *your* portable tool problems? We'd like to tackle them!

AIR O'TOOL

THE ROTOR TOOL CO.
CLEVELAND, OHIO
UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS



# ...IN PREPARING MATERIALS?

How many moves . . . how many tons of materials must the average foundry move to produce one ton of castings? Let's figure it out, using only the materials preparations section of a foundry flow chart shown here.

METALS. It takes an average of 1.3 tons of metal to produce a ton of castings. Move that metal from storage — to melting — to pouring — and you've moved 1.3 tons twice for a total of 2.6 tons plus returning of gates and risers for remelt.

COKE, ETC. From storage — to melting — you move .12 average tons. Total, .12 tons handled.

CORE SAND. From storage—to preparation—to cores—to racks—to ovens—to molders, you move .5 tons of sand five times. Total, 2.5 tons handled —plates and driers not included.

SAND PREPARATION. From Shakeout—to iron removal—to screen—to storage—to mullers for tempering—to molders, you move 6 tons of sand six times. Total, 36 tons handled.

SAND REJECTS. From preparation tower — to dump, you move 3 tons. Total, 3 tons.

TOTAL TONS. 44.22 tons of materials moved to produce one ton of castings in just this small section of the total foundry operations.

A Rex Foundry Engineer will be glad to show how a cost reducing and efficient flow of materials can be achieved by the use of a Rex Foundry System. Chain Belt Company, 1671 West Bruce Street, Milwaukee 4, Wis.

CHAIN BELT COMPANY REX FOUNDRY HANDLING SYSTEMS

# Whiting Ladles

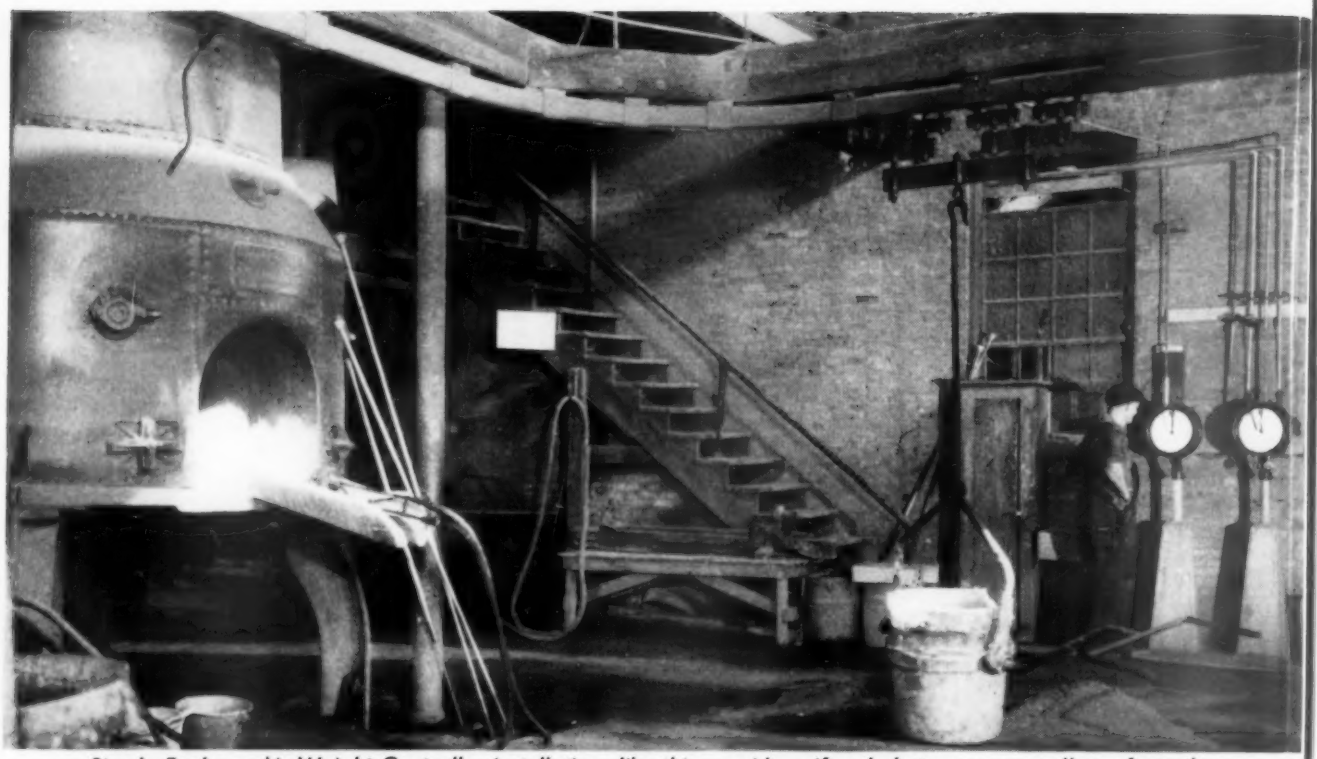
**mean handling hot metal with greater control, more accurate pouring, extra safety, lower maintenance, longer life**

WHITING Ladles were designed for foundrymen BY foundrymen . . . men who work right in the shop getting the data they need . . . men who live constantly with foundry operating problems, and have spent over 60 years designing better foundry equipment.

Whiting Ladles are of welded or riveted construction, with high-grade long-life gearing (antifriction bearings), oil- bath lubrication, and other features that assure long, dependable service. Available in styles and sizes for every foundry need. Write for Bulletin FY-144.

**WHITING**
**CORPORATION**
**15607 Lathrop Avenue, Harvey, Illinois**

*Offices in Chicago, Cincinnati, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, and St. Louis. Agents in other principal cities. Canadian Subsidiary: Whiting Corporation (Canada) Ltd., Toronto, Ontario. Export Department: 30 Church St., New York 7, N. Y.*



*Simple Foxboro Air-Weight Controller installations like this provide uniformly hot pours regardless of weather.*

# bigger returns on your investment through *better controls*

**NEW MODEL 40**
**AIR-WEIGHT CONTROLLER**

## FOXBORO AIR-WEIGHT CONTROLLER

**Installed on any blower,** whatever the make or type, this exclusive Foxboro development correctly controls the blast . . . by weight of air instead of by volume. It compensates for varying pressure and temperature conditions . . . makes *every day a good pouring day.*

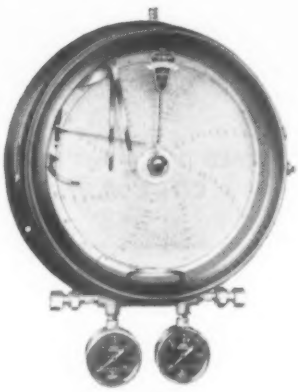
The NEW MODEL 40 shown at left is specifically designed to meet today's trend to higher operating pressures as a result of coke conditions, mechanical charging and increased production schedules. It provides improved control and greater convenience.

Over a thousand Foxboro Air-Weight Controllers are installed in leading foundries throughout the country. Results reported include; better and more uniform quality, fewer rejects, less coke used, increased output, smoother operation. Send for Bulletin B-268 for complete details. **The Foxboro Company, 32 Neponset Ave., Foxboro, Mass., U. S. A.**

**RECORDING CONTROLLING INDICATING**

## FOXBORO ELECTRONIC INDICATOR for NON-FERROUS POURING TEMPERATURES

The super-fast measuring action of the unique Foxboro Dynalog Electronic Temperature Indicator cuts down the time of thermocouple immersion . . . reducing thermocouple replacement. The simplified mechanism of this instrument that measures without a slidewire, results in much longer instrument life, higher sustained accuracy, and virtual freedom from maintenance. Specially designed Foxboro thermocouples for molten aluminum and brass are available to match the superior performance of the Dynalog Indicator.



## FOXBORO CORE-OVEN TEMPERATURE CONTROLLER

For keeping core-ovens at correct temperatures, this accurate, dependable instrument is especially advantageous. It prevents over or under heating and fuel waste. It is either air-operated as shown, or electrically (Rotax) operated. Both types provide a continuous, useful record of core-oven operations.

## FOXBORO WIND-BOX PRESSURE RECORDER

Pressure records provided by this instrument enable operator to keep close tabs on cupola conditions. Results of blast restrictions, such as clogged tuyeres, or bridging over of the charge, are visually indicated in time to permit adjustments. Proven in hundreds of plants, the simple, sturdy Foxboro wind-box pressure recorder is a valuable addition to any cupola.

## OTHER FOXBORO INSTRUMENTS FOR BETTER CONTROL OF

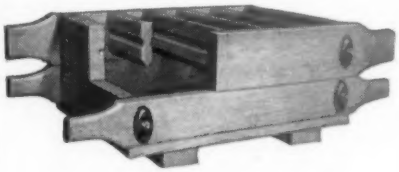
- Plating operations and Cleaning Baths.
- Annealing and Normalizing.
- Air-System Pressures.
- Sand-dryer Temperatures.

**INSTRUMENTS BY FOXBORO**

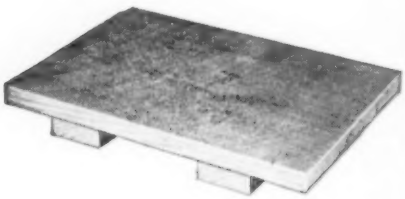
Reg U S Pat Off

# CMD FOUNDRY SPECIALTIES

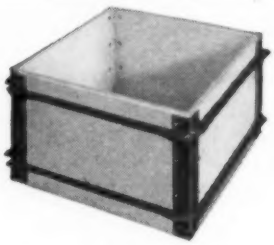
**WEDGES**
Hard or soft wood



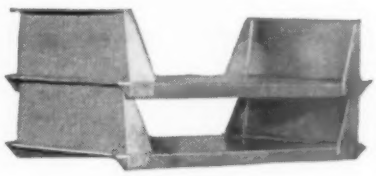
**CMD WOOD FLOOR FLASKS**
All sizes and shapes



**CMD WOOD BOTTOM BOARDS**
All sizes and shapes



**CMD NON-WARP, NON-BURN SLIP JACKETS**



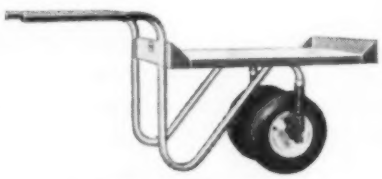
**CMD DUAL-PURPOSE CORE TRAYS**

**CMD TYPE F CHIPPING HAMMER**
Metal handle. Head has 2 chisels at right angles

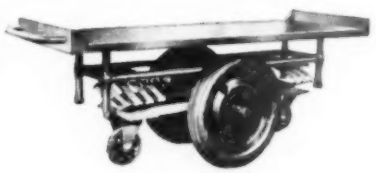
**CMD TYPE A CHIPPING HAMMER**
Combination drift and chisel

**CMD TYPE C CHIPPING HAMMER**
For general hand chipping

**TEXTITE AIR SEPARATOR**
Cools, cleans and dries the air in one operation. *No moving parts.* Saves air tools. Nothing to replace.



**CMD PNEUMATIC CORE BARROWS**
With single wheel or two wheels. (as shown here)



**CMD PNEUMATIC CORE TRUCKS**
Minimize core chafing and breakage

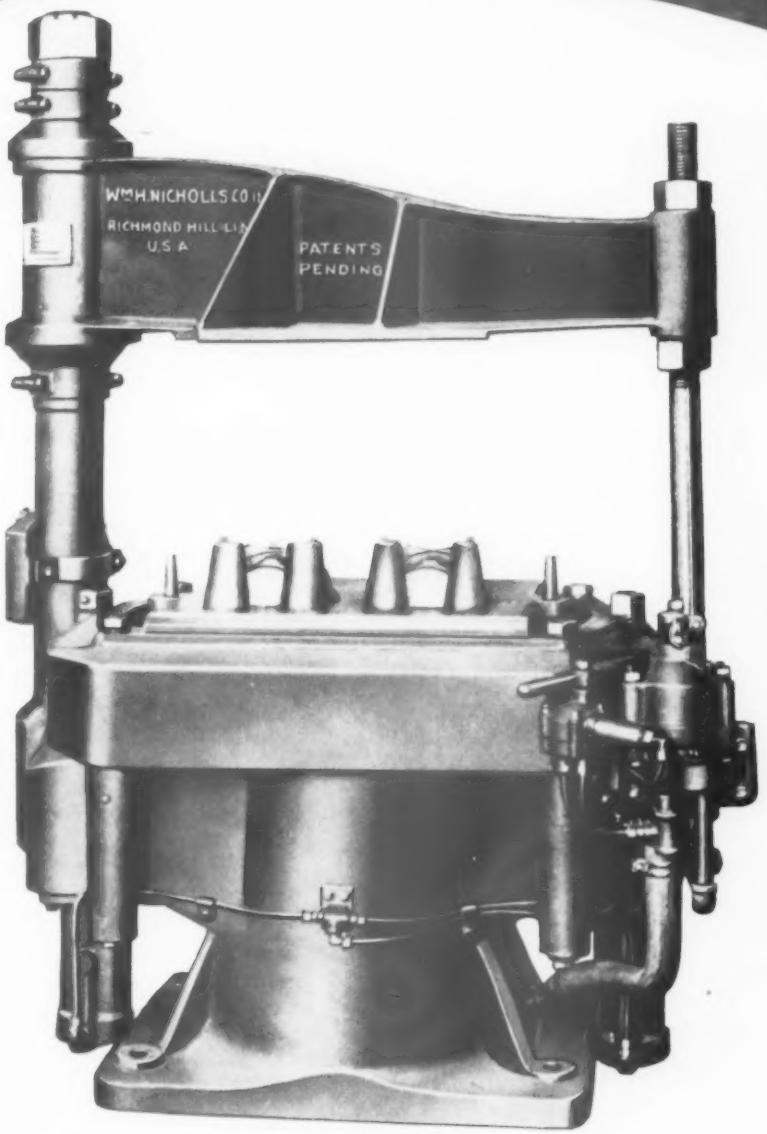
**WRITE FOR BULLETINS**
On CMD core-conveying equipment and other foundry specialties—preferred by experienced foundrymen for 25 years.

## CHICAGO MANUFACTURING & DISTRIBUTING COMPANY

**1928 WEST 46th STREET CHICAGO 9, ILLINOIS**

# NICHOLLS

## ... Another Name For Precision Molds In Quantities!




● Nicholls Molding Machines have the enviable reputation for producing precision molds in endless quantities. This superior ability to give Foundries exacting results is a well-known fact . . . backed by thirty eight years of Nicholls Know-How!

We invite your inquiries about specific models . . . stationary or portable.

14-36 Type "D" Heavy Duty Jolt Squeezer with Pneumatic Pattern Draw.

**Wm. H. NICHOLLS Co., Inc.** RICHMOND HILL 18, LONG ISLAND, NEW YORK

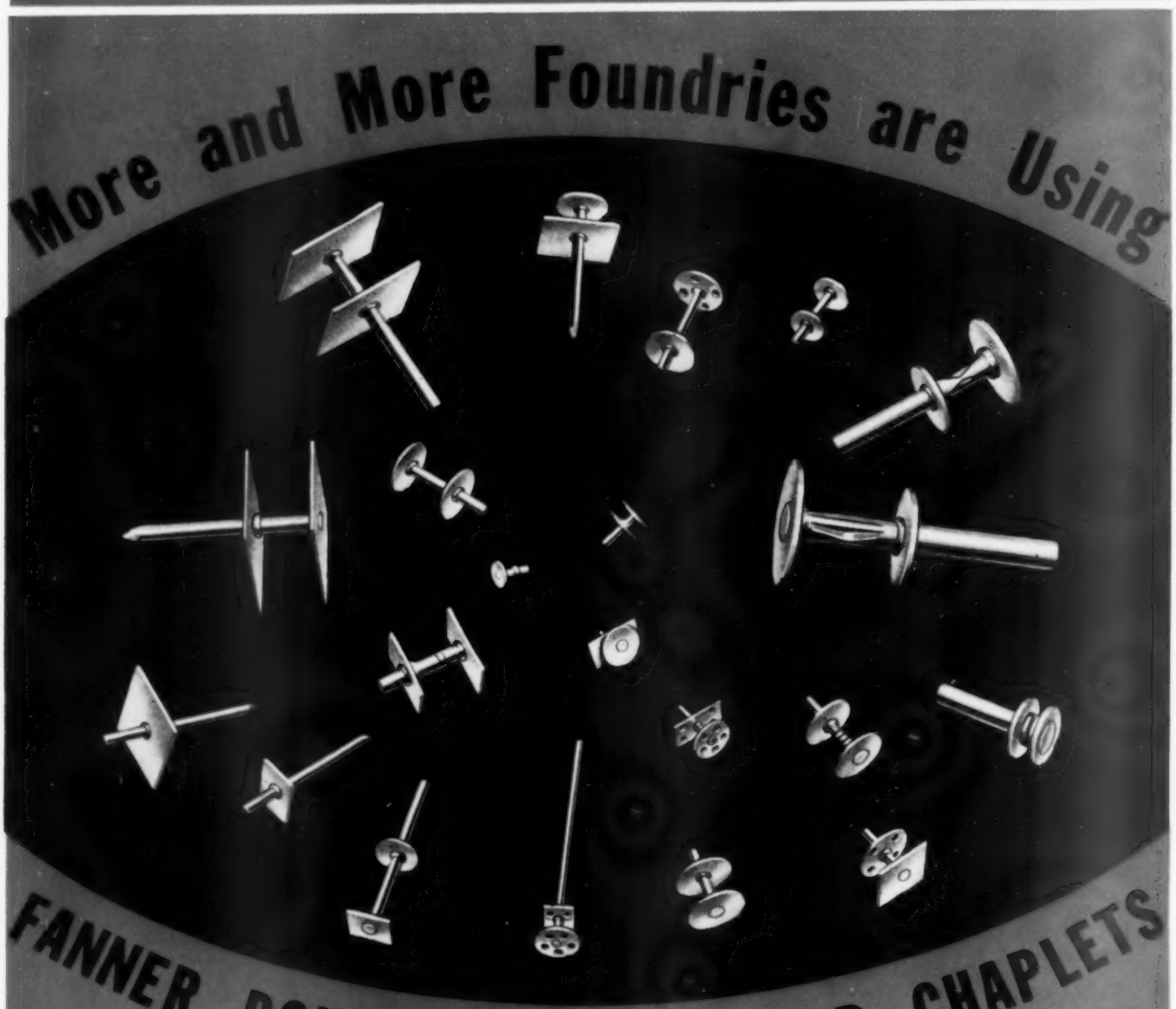
ESTABLISHED 1910

FOREIGN MANUFACTURERS AND SELLING AGENTS FOR CONTINENTAL EUROPE AND GREAT BRITAIN — GEORGE FISCHER, LTD., SCHAFFHAUSEN, SWITZERLAND

# NICHOLLS

# IT'S FANNER for CHAPLETS

## More and More Foundries are Using



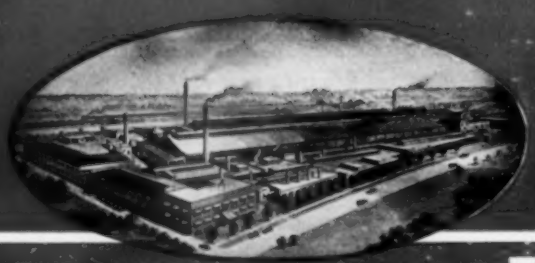
## FANNER DOUBLE HEAD ANCHOR CHAPLETS

Over 100,000,000 Chaplets in Stock

These specially Fanner designed chaplets are rapidly replacing other types of chaplets in foundries the country over . . . BECAUSE THEY ARE EXTRA ADDED INSURANCE OF PRECISION CASTING.

The reason is the extended stem which serves as a definite anchor in holding the chaplet in place, keeps it from being washed away in the molten metal.

If you're using any kind of chaplets, by all means investigate these Fanner Chaplets without delay.



Birdseye view of the Fanner Brookside Park plant in Cleveland

**THE FANNER MFG. CO.**

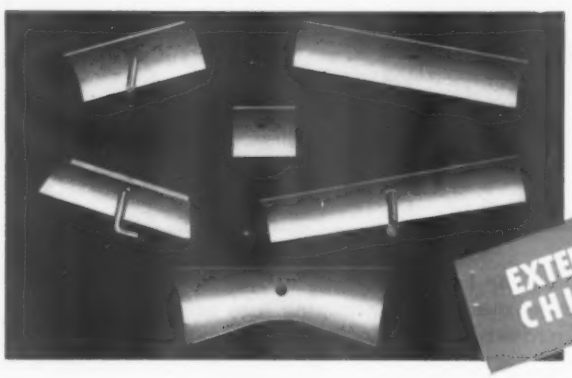
*In Canada:* **CANADIAN**

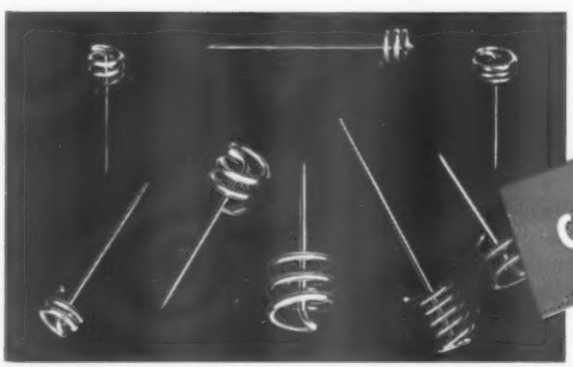
# IT'S FANNER for CHILLS

## 6 *Reasons why the patented*

## Sharply Cuts Your Casting Losses

1. Completely eliminates "piping".
2. Cuts down, and in many cases, eliminates "risers".
3. Provides sufficient volume to insure uniform solidification between center and outer surfaces.
4. No flat horizontal surfaces which produce "chill kicks" or "blows".
5. Top surfaces converge upwardly to a point so that top is gradually enveloped in molten metal, and ample time is allowed for any generated gases to escape before Super chill is completely submerged and fused.
6. Square section Super chills, placed horizontally, can be so located that there is no horizontal flat top surface, but always a sharp surface. Lastly, often when a round chill is used the fusion is not complete, and when drilled, the chill turns with consequent drill breakage. The square Super chill cannot turn, and the corners aid in fusion.




## *Memo to* ALUMINUM and MAGNESIUM FOUNDRIES

**Your chilling problem is the same as that of steel foundries**

**Do you realize that FANNER chills are now available in aluminum and magnesium?**

**Prevent shrink defects — produce better castings at lower cost— by use of properly designed and fabricated FANNER chills.**

**Our engineering staff will gladly advise you on your problems— without obligation.**

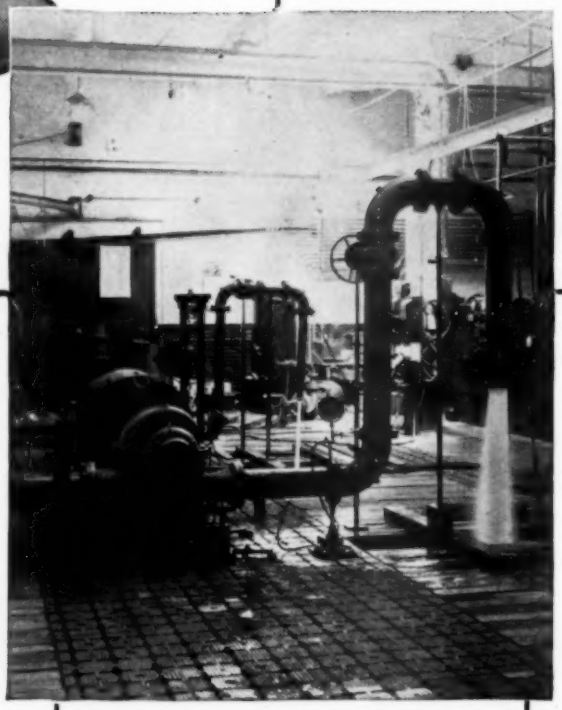
**BROOKSIDE PARK, CLEVELAND 1, OHIO**

**FANNER LTD., HAMILTON, ONT., CANADA**

**FOR HANDLING FLUIDS CONTAINING SOLIDS** up to 6 inches in diameter, Gardner-Denver Sewage and Waste Disposal Pumps are built in capacities from 50 to 5000 gallons per minute.

**RUGGEDLY CONSTRUCTED FOR LARGE CAPACITY** Gardner-Denver Horizontally Split Case Double Suction Centrifugals are available in sizes for all heads up to 300 feet.

**COMPACT** Gardner-Denver Close-Coupled Centrifugal Pumps may be installed in any horizontal or vertical position—are designed for capacities up to 250 gallons per minute and heads up to 250 feet.



Gardner-Denver's modern hydraulic testing laboratory, showing centrifugal pump direct connected to Dynamometer for efficiency test.

**FOR GENERAL UTILITY SERVICE** Gardner-Denver Side-Suction Centrifugal Pumps are made in capacities up to 1600 gallons per minute and heads up to 100 feet.

# Fully Tested For Full-Value Efficiency Gardner-Denver Centrifugal Pumps

*Since 1859*

You can be sure of getting *full-value* efficiency on every one of your pumping jobs when you insist on Gardner-Denver *fully tested* Centrifugal Pumps. For every Gardner-Denver pump you buy has already proved its dependability and power economy — through thorough and accurate testing in our modern hydraulic laboratory, completely equipped with the best and most accurate testing equipment available. It's no wonder these popular pumps so easily attain and often exceed their rated efficiencies in hundreds of different kinds of pumping installations.

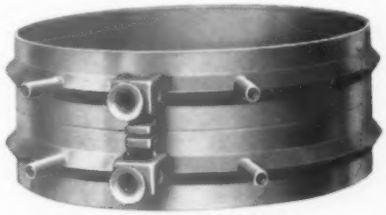
For expert advice on selecting just the right Gardner-Denver Centrifugal for any installation, or for further information on any of the pumps described here, write Gardner-Denver Company, Quincy, Illinois.

**GARDNER-DENVER**

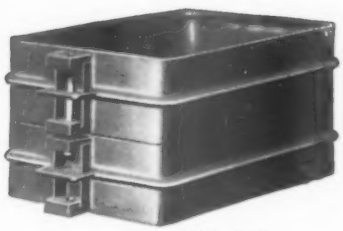
# THE DEPENDABLE *Sterling* LINE OF STEEL FOUNDRY FLASKS

North American foundries . . . more than 4,000 of them . . . have adopted Sterling Steel Flasks for greater efficiency, longer life and more profitable foundry operation. These same foundries continue to specify Sterlings whenever more flasks are needed. That's because Sterlings have the strength and rigidity to resist distortion and to take hard, everyday punishment. Fabricated from special rolled steel channel into one solid, rigid piece, Sterling Flasks are capable of withstanding tremendous pressures. They retain their rigidity and accuracy over a long period of years. Available in a variety of styles and shapes. Write for your copy of Sterling Catalog No. 59.

Style "GGX"
with Single Pin Lugs and
Two-Man Lift Handles



Style "BBLT"
with Trunnions and
Two-Man Lift Handles

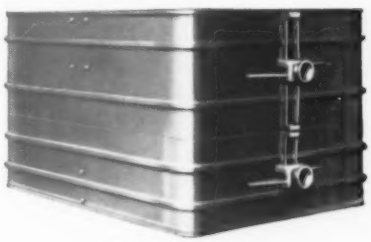


Style "A"
with Double Pin Lugs

Style "A"
Flask Sections
Stacked One Above Another
for Multiple Molding

Style "S"
with Pin Lugs and
Handles Combined

Style "H"
with Pin Lugs
Welded on Sides



Style "¾ NT-NNT"
Heavy Duty Flask
(Patent No. 1974292)

Style "LL"
with Angle Reinforcement
and Two-Man Lift Handles

Style "¾ NT-NNT"
with Heavy Duty Clamps
and Clamping Bars
(Patent No. 1974292)

## STERLING WHEELBARROW CO.

**MILWAUKEE 14, WISCONSIN, U. S. A.**

Branch Offices: Boston • Buffalo • Chattanooga • Chicago • Cleveland • Detroit • New York • Philadelphia • St. Louis

# THE DEPENDABLE *Sterling* LINE OF MODERN FOUNDRY EQUIPMENT

In addition to Steel Flasks, Sterling offers a complete line of Flask accessories and a variety of foundry equipment. Custom-built for heavy duty foundry service and high-speed production schedules, every piece of equipment is backed by the well-known Sterling reputation for correct design and excellent workmanship. The Company has always maintained a policy of fabricating to high quality standards. Consult Sterling the next time you require foundry equipment. The Sterling branch office near you will gladly give you information and estimates — or write to factory.

Heavy Duty Cart with "3-Point" Landing

No. 116-A Heavy Duty Wheelbarrow

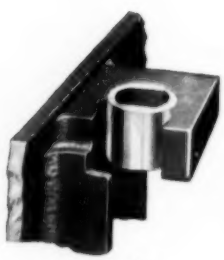
No. 50 Slag Buggy

No. 110-A Core Truck

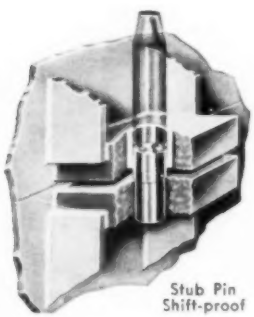
No. 150 Atlas Heavy Duty Truck

No. 160 Heavy Duty Casting Truck

Sterling Flask Clamp

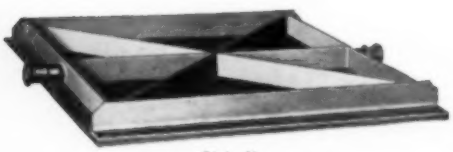


Standard Hardened Steel Bushing



Stub Pin Shift-proof

Caster with Pneumatic Tire



Style X Bottom Board with Trunnions

Style X Core Plate

Standard Type "S" Flask Pin

No. 47 Casting Cart

Hardwood Foundry Wedges

# STERLING WHEELBARROW CO.

## MILWAUKEE 14, WISCONSIN, U. S. A.

Branch Offices: Boston • Buffalo • Chattanooga • Chicago • Cleveland • Detroit • New York • Philadelphia • St. Louis

## CASTFLUX

**The National Dual Purpose Flux is used effectively**

### IN THE LADLE

Cleanses and purifies the metal, bringing to the surface occluded oxides, gases, slag, dirt, and other foreign matter, offsetting the negative factors of inferior scrap and coke.

**ON BOTH BLIND AND OPEN RISERS CASTFLUX** raises the temperature of the metal to a much higher degree and substantially increases and maintains the fluidity of the metal during the entire cooling-down period.

***This is the CASTFLUX UNCONDITIONAL GUARANTEE**

Unless our representations are proven within 30 days after receipt of material, it can be returned at no expense to you.

One of the questions we're asked by foundrymen is "How much will it cost us to use Castflux?" We quote the above figures. But does Castflux really add to the cost of production? Theoretically no! Because when the expenditure for a product eliminates losses far in excess of its cost there are savings that otherwise would not be in the pocket.

Why not put our claims to the test? Castflux is sold on an unconditional guarantee*. You risk no money. Write us for prices, complete data.

## NATIONAL

**PIGMENT COMPANY**

2115-2117 EAST YORK STREET

PHILADELPHIA 23, PA.

As Usual ....LOOK TO

# LANLY

FOR THE *Unusual*

IN **OVENS**

FOR SPECIALIZED FOUNDRY WORK

Here, the features of shelf, drawer and rack-type ovens are combined in one compact unit.

Unique duct arrangements supply heated air and return it for reheating in these Lanly mold drying benches.

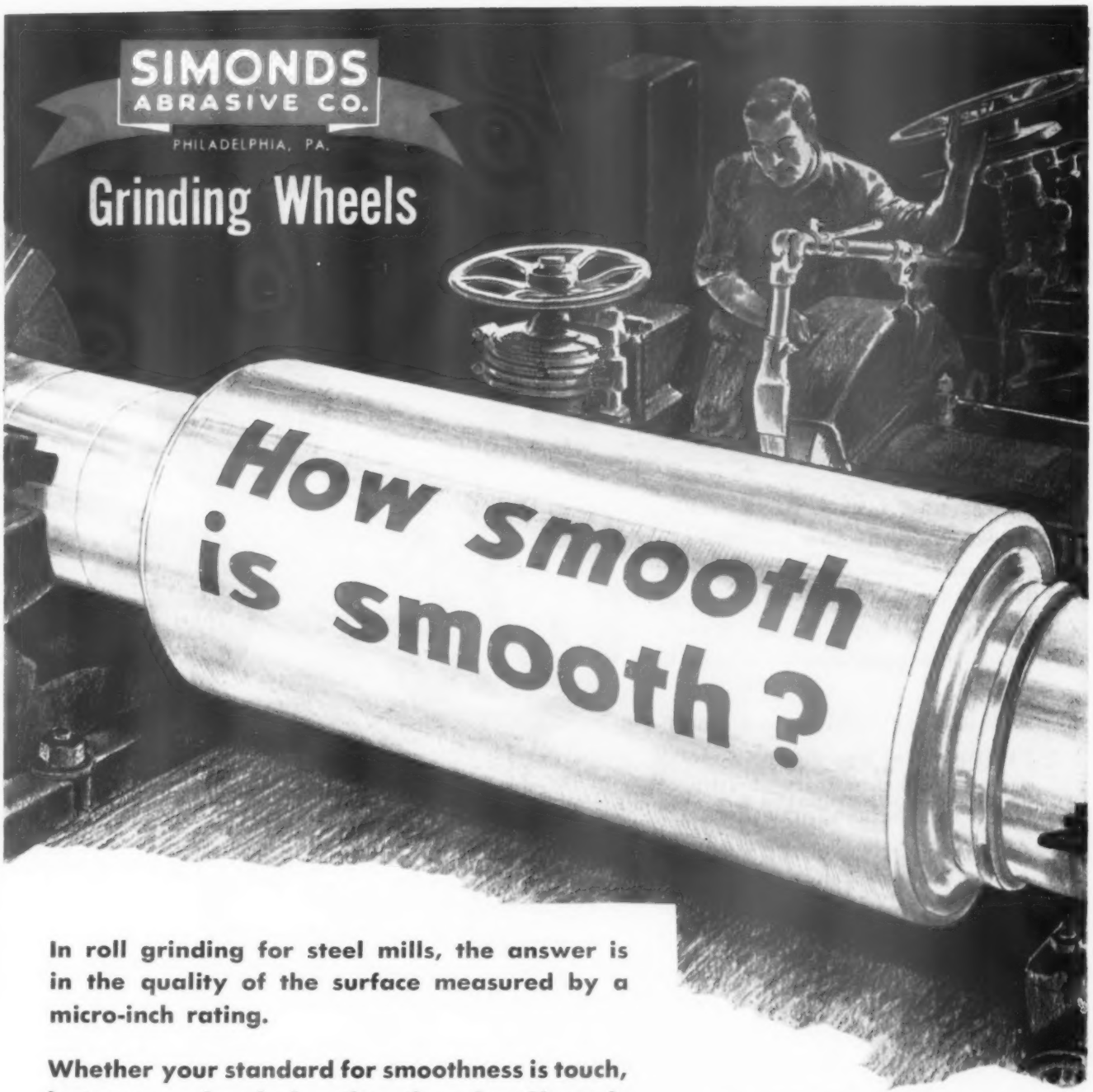
More than 60% increased capacity over conventional single end drawer ovens is gained in this Lanly designed Dual End Drawer Oven.

LANLY invites your inquiries regarding proposed installations and modernization of present installations.

THE LANLY CO.

OVENS FOR INDUSTRY

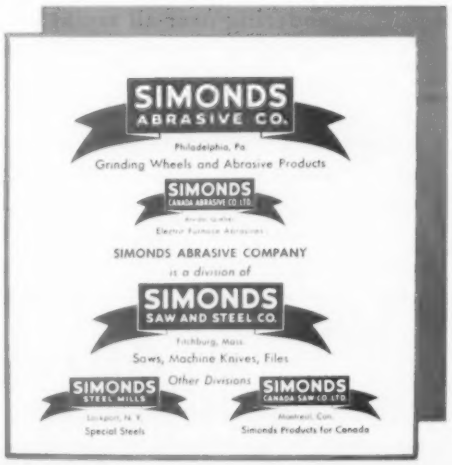
780 PROSPECT AVENUE • CLEVELAND 15, OHIO




**In roll grinding for steel mills, the answer is in the quality of the surface measured by a micro-inch rating.**

**Whether your standard for smoothness is touch, lustre or a micro-inch rating, there is a Simonds Abrasive wheel which is right . . . right in grain, grade, bond, size and shape . . . right in smooth operating efficiency reflected in long grinding action, quality output, better results per wheel dollar.**

**Your nearby Simonds Abrasive distributor is part of a smooth functioning distributor set-up in leading industrial centers. Let's send you his name and a copy of our Data Book describing Simonds Abrasive Company's complete line.**



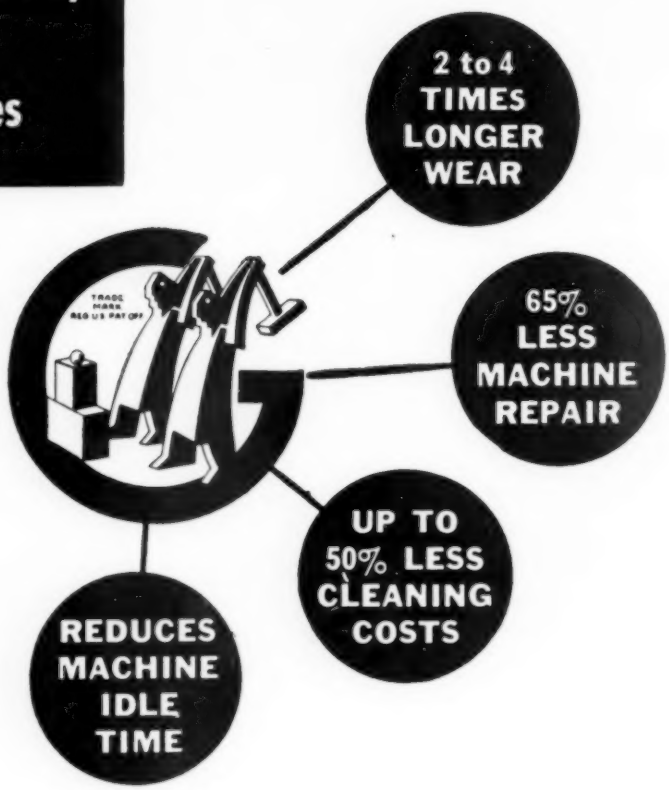

**SIMONDS ABRASIVE COMPANY, PHILADELPHIA 37, PA. DISTRIBUTORS IN PRINCIPAL CITIES**

PATENTED

# Malleabrasive

## GIVES YOU

**Matches the Potential Efficiency of Modern Airless Blast Cleaning Machines**




**Malleabrasive** enables you to realize bigger returns on your investment in your airless blast cleaning equipment because it enables you to obtain the high-speed, big-production cleaning which such equipment is intended to provide.

Why limit the usefulness and productive capacity of your modern cleaning units by using ordinary abrasive or chilled iron shot and grit when MALLEABRASIVE can increase your output of cleaned castings, reduce your maintenance and parts replacement costs, lower your abrasive consumption?

## *The Only Blast Cleaning Abrasive of Its Kind!*

Malleabrasive is produced under patent by the exclusive Malleabrasive process and is not to be confused with ordinary shot and grit described "Heat-treated" or "annealed," or by trade names connoting such treatments. The performance of Malleabrasive in rendering over-all savings in blast cleaning costs as compared with chilled iron shot—regardless of how such material is described—*is guaranteed* when comparative test runs are properly conducted.

**Malleabrasive Savings Proven.** You don't have to accept mere claims for Malleabrasive savings; they are proven by performance and actual records from many plants. Over 300 plants now using it. The use of thousands of tons over the past nine years has proven its merits.

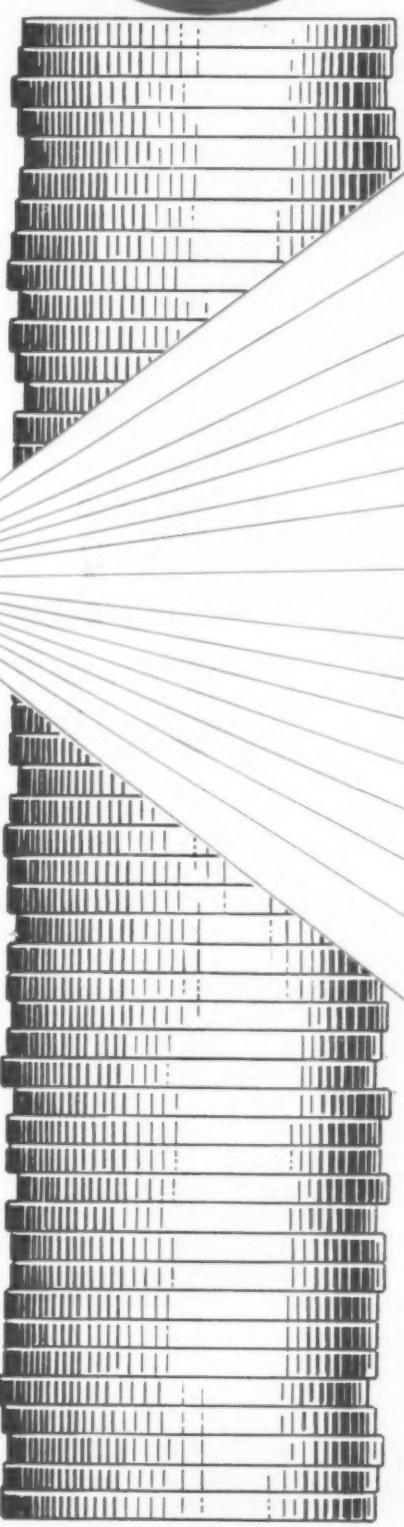
**Prove Savings for Yourself.** Whether you clean grey iron, malleable or steel castings, Malleabrasive will show definite savings for you in airless blasting equipment. Our blast cleaning engineers will show you the way.

## GLOBE STEEL ABRASIVE CO.

**MANSFIELD, OHIO**

**LASTS LONGER • INCREASES PRODUCTION OF CLEANED CASTINGS**

# *Hercules* TRULINE BINDER *Cuts Core Room Losses*



**IN STEEL FOUNDRIES**
**using Silica Flour, Bentonite, or Fireclay...**

- "TRULINE" REPLACES CORE OIL
- MAKES MORE UNIFORM CORES
- GIVES SAME PHYSICAL PROPERTIES
- UP TO 25% FASTER BAKING
- SOUNDER, TRUER CASTINGS

**IN IRON FOUNDRIES**
**using Pitch-compound Mixes...**

- "TRULINE" ELIMINATES PITCH
- GIVES STRONGER-HANDLING CORES
- EASIER-COLLAPSING CORES
- UP TO 50% LESS CLEANING TIME
- FEWER CRACKED CASTINGS
- CLEANER CASTINGS
- ELIMINATES SCABS

*32-page book gives details. Send for copy today.*

*HERCULES POWDER COMPANY*
INCORPORATED
*920 King Street, Wilmington 99, Del.*

"TRULINE" IS REG. U. S. PAT. OFF.

NF9-1

# *Lynchburg foundry*

## mexacote

*Lynchburg worker spraying green resin core for clutch housing with a 15° Mexacote solution. Green resin core for transmission is waiting to be sprayed. Baked cores may be dipped for Mexacote treatment.*

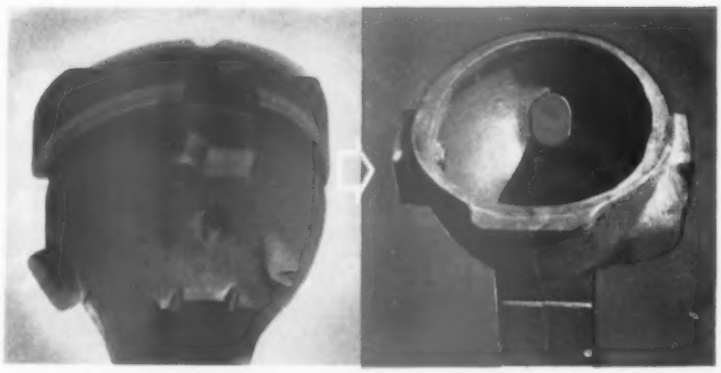
*Mexacote-sprayed green resin core for clutch housing is placed in the oven for drying. Some cores are first baked and then given a 40° Baume' coating of Mexacote.*

**THE UNITED STATES GRAPHITE COMPANY**

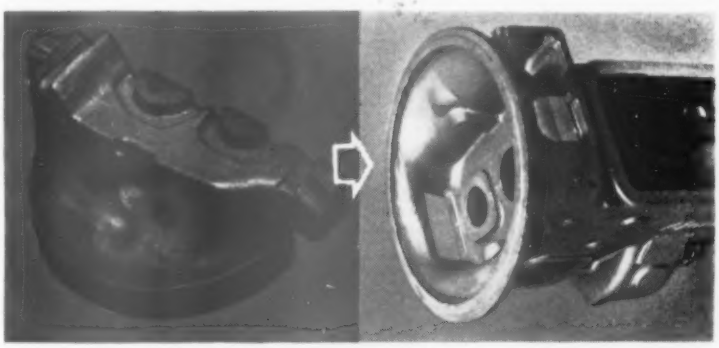
# *sprays cores with for finer casting finish*

**To find** a product that would produce a high surface hardness on their cores and give a better casting finish, the Lynchburg Foundry Company tested many different products. After exhaustive tests on a wide variety of cores they found that MEXACOTE would do exactly what they wanted it to do. Say Lynchburg engineers: "Now we spray all cores — where spraying is possible—with a 15° Baume' solution of MEXACOTE and the results have been highly satisfactory."

**When you** want a better casting finish, spray or dip molds and cores with MEXACOTE. It quickly mixes with water and thins to a spraying consistency. MEXACOTE forms a firm coating that will not crack, shrink, scab, peel or buckle under heat, and can be dried by torch, lamp, or oven. A solution of 20° Baume' is usually recommended for spraying, 35° for dipping. MEXACOTE holds true core dimensions, does not run or build up — penetrates sand to prevent burning in. Write for special MEXACOTE bulletin.



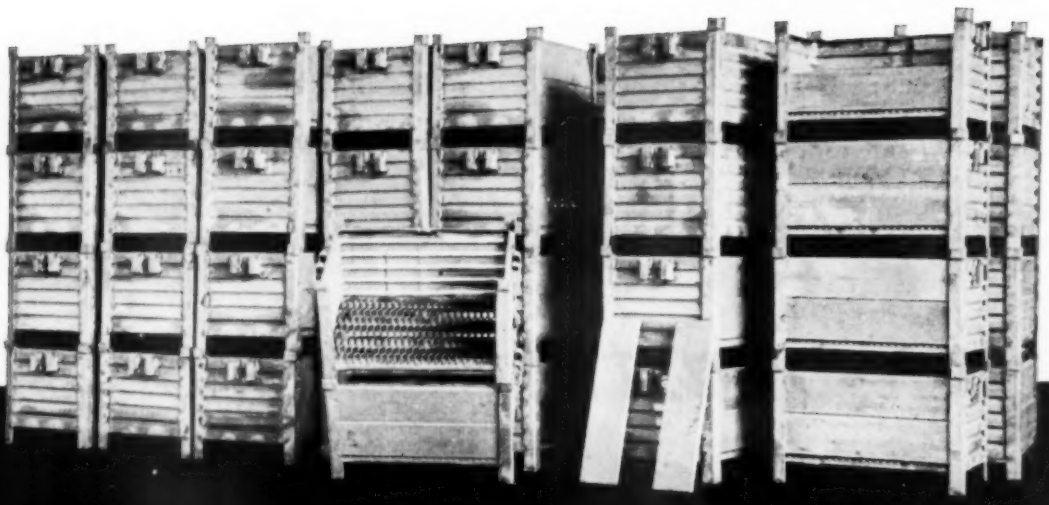
*From core to casting. The picture at left shows one part of the core assembly for clutch housing after having been sprayed green with Mexacote and baked. At right is the casting. Note fine finish that will require minimum finishing.*



*At left, resin cores for part of truck transmission case are sprayed green with Mexacote. At right is the transmission case after casting. Note absence of veining of cored surfaces.*

**mexacote**

*DIVISION OF THE WICKES CORPORATION • SAGINAW, MICHIGAN*



Truscon Open-Side Steel Boxes

# TRUSCON

# *Speeds* FOUNDRY *Efficiency*

## WITH STEEL EQUIPMENT FOR MOLDING, MOVING & STORING FOUNDRY MATERIALS

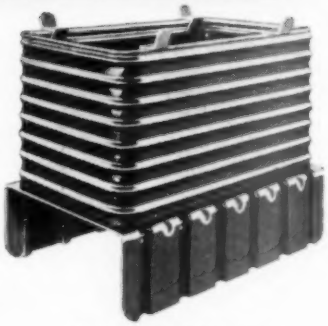
Truscon TM-10 Two Man Flask

**TRUSCON OPEN-SIDE BOXES** *(shown above)*
. . . speed efficiency through side-loading and tiering. Materials are easy to store, easy to get at, easy to inventory!

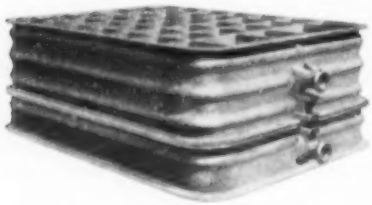
**TRUSCON MATERIALS HANDLING EQUIPMENT**
. . . speeds efficiency because pallets and platforms are designed to properly fit modern lifts, and are ruggedly built to stand the gaff of foundry use.

**TRUSCON STEEL FOUNDRY FLASKS**
. . . speed efficiency through ease of operation, ease of handling, and through long, trouble-free service.

*Send for catalog, complete with specifications and details, on Truscon Materials Handling Equipment and Truscon Steel Flasks.*



Type PB-120 Truscon Steel Box and Platform



Truscon CH-40 Crane Flask

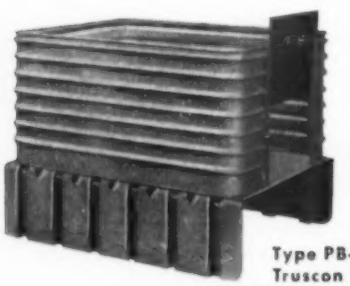
Truscon OM-1 One Man Flask

# TRUSCON STEEL COMPANY

**PRESSED STEEL DIVISION**

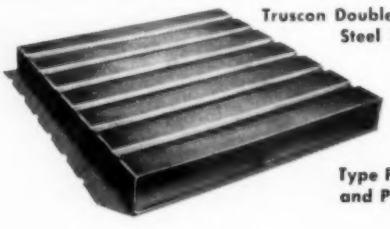
6100 Truscon Avenue • Cleveland 4, Ohio

Subsidiary of Republic Steel Corporation

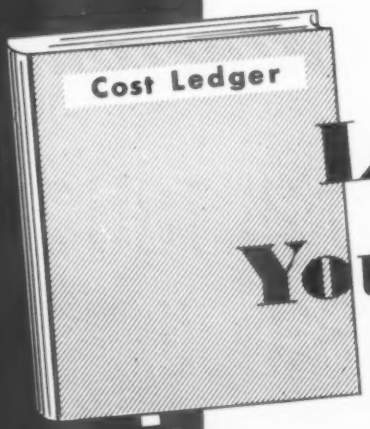


Type PB-650 Truscon Box and Platform with sliding end door

Truscon Double Face Steel Pallet



Type PB-120T Truscon Steel Box and Platform with Tiering Lugs




# Let's look at Your sand costs

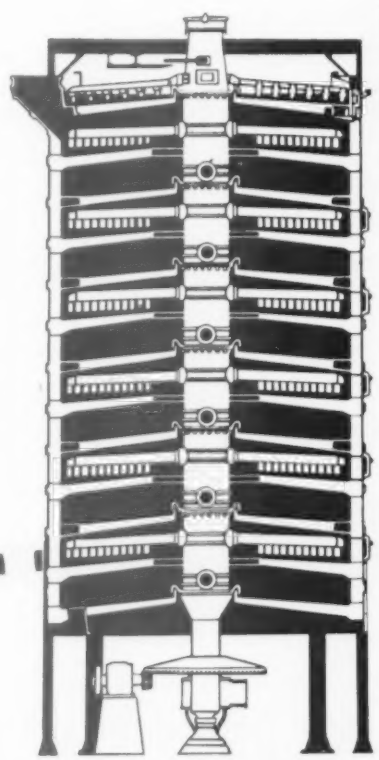
1. How much each year for sand?
2. How much for freight and for handling?
3. How much for used sand disposal?

## *Now—Let's Compare What Nerco Sand Reclaiming Equipment Offers*

A. Substantially reduced sand shipments.
B. Freight and handling charges reduced to a minimum.
C. No used sand disposal cost or problem.
D. Reclaimed sand that is free from clay, fines and organic matter. A sand that looks new—works like new and at a cost far below new sand.

Nichols offers a choice of equipment to fit every foundry's sand problem with the utmost in economy and quality of product.

Nichols engineers will gladly survey your requirements and submit recommendations without obligation. Write and let us give you all the facts.



## NICHOLS
### ENGINEERING & RESEARCH CORPORATION

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NERCO

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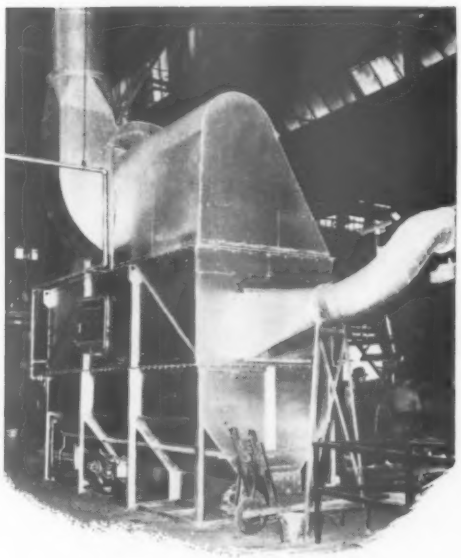
THESE and many other leading manufacturers in the farm equipment field protect their products with Tousey Casting Sealer. Tousey originated the manufacture of casting sealer to rigid specifications. Copies of these specifications, revised over the years to meet current needs, are available on request.

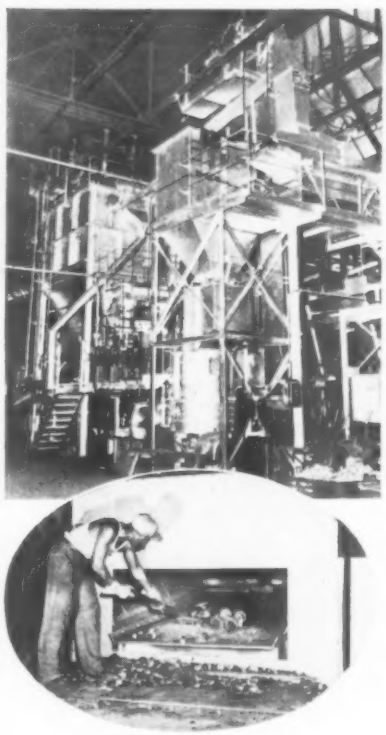
TOUSEY VARNISH CO., 520 W. 25th Street, Chicago 16, Ill.

TOUSEY PRODUCTS
CASTING SEALER

# DUST IS OUT AT OHIO BRASS!



***Roto-Clone dust control helps make modern foundry a model for cleanliness and efficiency***



No dust here! Shakeouts and sand reconditioning plant of Ohio Brass foundry served by Type N Roto-Clone.

THIS malleable iron foundry at Ohio Brass Company, Mansfield, Ohio, is completely mechanized for production line operation. And as for dust—there just isn't any with a Type N Roto-Clone* at work. The unit, pictured above, serves both automatic shakeouts and the sand reconditioning plant. The moment dust is generated it's on the way out—out of the air into the Roto-Clone.

The Type N Roto-Clone offers truly mechanized dust control. This Hydro-Static Precipitator delivers high efficiency dust separation and collection by a combination of centrifugal force and thorough scrubbing of the air by a water curtain. The unit operates with a minimum of attention and, by exhausting a constant air volume, assures effective dust removal at all times. Secondary dust problems are eliminated completely by the Type N as the collected material is discharged as a sludge for easy disposal.

Dust costs you dollars every day it has free run of your plant. It can be controlled effectively, economically by Roto-Clones. There's a type and size to fit every need from stand grinder to electric furnace. For complete information, call your nearby AAF representative or write direct for Roto-Clone Bulletin No. 277-A.

## AMERICAN AIR FILTER COMPANY, INC.

**266 Central Avenue, Louisville 8, Ky.**

*In Canada: Darling Bros., Ltd., Montreal, P. Q.*

AAF

**ROTO-CLONE®**
**DUST CONTROL EQUIPMENT**

**Roto-Clone is the trade-mark (Reg. U.S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and hydrostatic precipitator types.*

# For Increased Better Working

*Mechanize with*

## PROVED ALLIS-CHALMERS FOUNDRY, POWER AND ELECTRICAL EQUIPMENT

Bonus production is possible in your foundry with modern Allis-Chalmers equipment used in connection with melting and casting, sand conditioning and reclamation, and a complete line of heavy-duty *Foundromatic* shakeouts. All this equipment has been designed to increase efficiency. Allis-Chalmers engineers cooperate with foundry engineering firms not only in making the foundry more productive, but also a clean, healthful and safe place to work.

In addition, *coordinated* performance is possible as Allis-Chalmers also manufactures a complete line of motors, drives and controls — plus electric generation and distribution equipment.

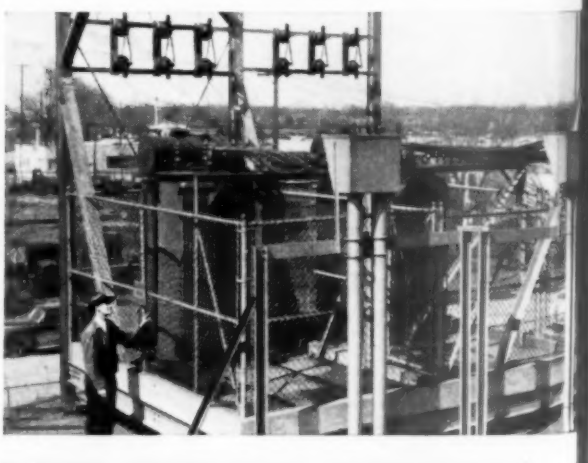
Thoroughly tested in Allis-Chalmers own foundries and others around the world, A-C equipment provides mechanization necessary for castings of low cost and high quality. Contact your nearest Allis-Chalmers office or write for Bulletin 25B6092B, describing the complete Allis-Chalmers foundry line.

ALLIS-CHALMERS, 1032A SO. 70 ST.
MILWAUKEE, WIS.

A 2673

**SAND CONDITIONING**

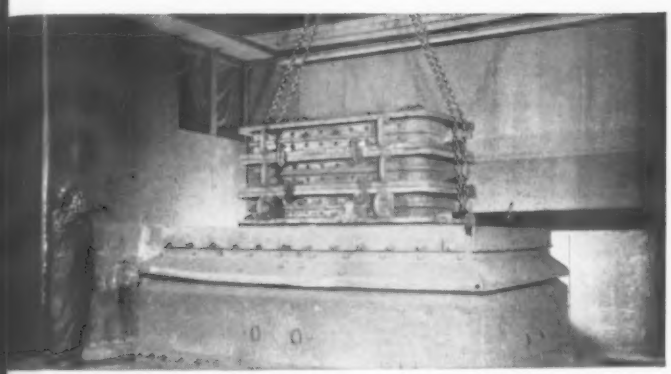
Up to 60 tons of broken core sand goes over this *Low Head* vibrating screen daily in a large Midwestern steel foundry. Allis-Chalmers builds three basic types of screens for foundries: including inclined and horizontal designs for wet and dry screening, aerating sand after mulling, screening shakeout sand, removal of refuse from new sand. High tensile steel alloy construction gives up to 50% more strength, reduces unit weight and cuts power requirements.



**POWER GENERATION—DISTRIBUTION**

Two 600 KVA Allis-Chalmers power transformers are shown installed on the roof of a large Milwaukee steel foundry. They are typical of Allis-Chalmers electrical equipment for foundry operation — a-c and d-c generators, steam driven generators, motor-generator sets, any size power and distribution transformers, switchgear and circuit breakers, switchboards and voltage regulators. Allis-Chalmers equipment meets all the requirements for industrial protective service.

# Output... Conditions...

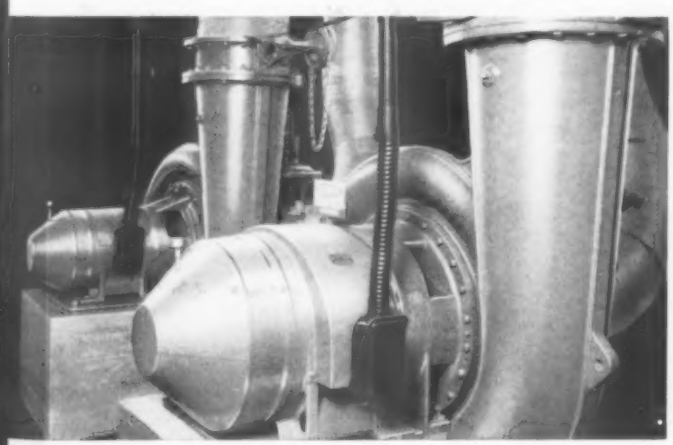


## "FOUNDROMATIC" SHAKEOUTS

Less than two minutes are required to shake out 25-ton flasks on an 8′ x 10′ *Foundromatic* shakeout. These heavy-duty shakeouts handle a wide range of flask sizes and shapes. Flask breakage is kept to a minimum as the load is evenly distributed over the deck. Offered in single units for stationary and portable types in sizes from 4′ x 6′ to 8′ x 10′. Capacities from 8,000 to 50,000 lbs. Higher capacities and deck areas can be obtained with multiple deck shakeouts.

## MOTORS—DRIVES—CONTROLS

Allis-Chalmers builds motors and controls for foundry applications requiring more than 1 hp: including a-c and d-c . . . open, protected and enclosed types. *Texrope* V-belt drives do not slip or jerk, are easy to install and safeguard. They are sold in matched sets, engineered to cut power transmission losses. They save space and provide flexibility of layout. When variable speed is necessary, *Vari-pitch* drives provide speed changes from 15 to 25% per sheave.



## CUPOLA BLOWERS

It pays to specify Allis-Chalmers blowers for your cupolas. Compact, simple in construction and extremely reliable, they have only one moving part, the impeller, which is usually "overhung" on the motor shaft . . . supported by the motor bearings. Cast casings result in a unit of rigid construction, deaden machine noises and eliminate vibration. Hundreds of A-C cupola blowers have been installed in foundries around the world.

## INDUCTION MELTING

Excessive burning off of alloying metals is avoided through use of Allis-Chalmers mercury arc frequency changing equipment for induction melting. Lines of flux passing through the melt create a positive stirring action, making puddling unnecessary. Clean induction heat improves foundry working conditions . . . promotes good will among the workers. Induction melting furnaces are available in several sizes for both ferrous and non-ferrous melting applications.

*Foundromatic, Low Head, Texrope* and *Vari-pitch* are Allis-Chalmers trademarks.

# ALLIS-CHALMERS

A-C ALLIS-CHALMERS

*Pioneers in Power and Electrical Equipment — Biggest of All in Range of Industrial Products*

# There's no guessing here!

In these days of rising costs and material scarcities, production men depend on Ingersoll-Rand Air Tools to take the guesswork out of cutting manufacturing costs and increasing production. From Ingersoll-Rand you get Air Tools which are faster—more powerful—lighter—smaller—smoother—safer—sturdier. Air Tools enable your workmen to do more work with less effort.

Call the nearest Ingersoll-Rand branch office to get the facts on our complete line of Air Tools—screw drivers—impact wrenches—grinders—chippers—riveters—hoists—drills—etc. Ask one of our representatives to show you how Air Tools pay for themselves nearly twice as fast under today's conditions.

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Ingersoll-Rand
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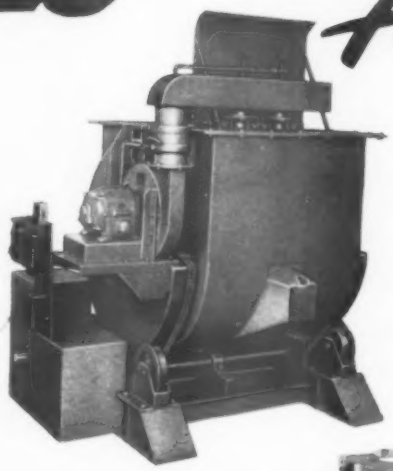
# STROMAN ... The Best Furnaces You Can Buy!



## THE NEW STROMAN "U" TYPE REVERBERATORY DIRECT FIRED FURNACE

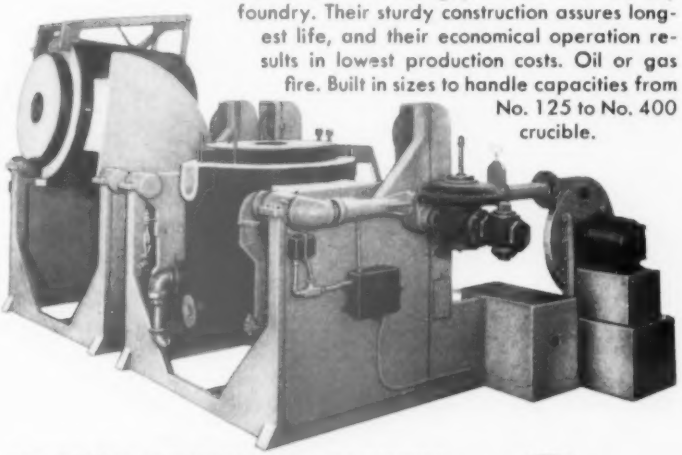
Stroman "U" Reverberatory is the fastest and most economical furnace ever built for the melting of iron, iron alloy, ferro-manganese, ferro-silicon, brass, copper, monel, nickel silver, aluminum and other alloys. It may be oil or gas fired and is also available with combination oil-gas burners. It is so designed that higher temperatures are attainable . . . is easily accessible for charging, pouring, skimming and alloying . . . mechanical tilt *forward and backward* . . . lowest refractory and full costs.

## ECONOMELT FURNACES

The Best Direct Fired Reverberatory Melting Furnace on the market! Its speed in melting Brass, Bronze, Grey Iron or Aluminum is unmatched! Continuous charging . . . with cold metal never reaching the molten batch, makes it practically a continuous pour furnace . . . and it will show upwards of 40% in fuel cost savings. Oil or gas fire. Also can be furnished with combination oil, gas burner. Capacities (Brass) up to 2000 lbs.

## STROMAN MECHANICAL OR HYDRAULIC TILT CRUCIBLE MELTING FURNACES

For Brass, Bronze, Aluminum and other non-ferrous metals. Stationary Lip Four assures a constant pouring arc, eliminating the necessity of moving the ladle at any time during a pour. They are excellent for use in permanent mold and die casting plants as well as any foundry. Their sturdy construction assures longest life, and their economical operation results in lowest production costs. Oil or gas fire. Built in sizes to handle capacities from No. 125 to No. 400 crucible.



## STROMAN IRON POT STATIONARY MELTING FURNACES

These furnaces are highly recommended as break down furnaces for zinc die casting plants. They also excel as aluminum holding furnaces. They can be supplied with or without hoods to exhaust fumes and heat. Their construction assures longest pot life and lowest fuel costs. Choice of manual or automatic controls and gas or oil fire. Capacities from 212 to 14,000 lbs. of zinc.

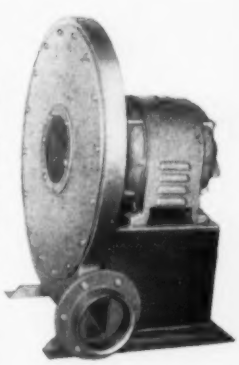
## STROMAN CRUCIBLE STATIONARY MELTING FURNACES

For Brass, Bronze, Aluminum and other non-ferrous metals. Sturdy, efficient and featuring the Stroman Push-Back Cover, these stationary furnaces are designed for peak production and greatest fuel economy. Oil or gas fire. Capacities from No. 20 to No. 400 crucible.

## STROMAN CENTRIFUGAL BLOWERS

Stroman Centrifugal Blowers have proved their superiority in the Industrial Heating Field by their simplicity, reliability, efficiency and economy. Their applications are many and they excel at all.

For metal melting furnaces, smelters, reverberatories, annealing, heat treating, core and drying ovens, tunnel kilns, etc. Drying paints, cooling glass, agitating liquids, exhausting fumes and dust . . . they guarantee trouble-free operation wherever they are used. Made in all sizes and to handle the capacities you need. Write for full information today.



**REMEMBER: Stroman makes all types and sizes of furnaces for the finest and fastest melting of iron, iron alloys, brass, bronze, aluminum, magnesium and all other non-ferrous metals. Write for complete literature.**

# STROMAN FURNACE & ENGINEERING CO.

DIVISION OF

THE PETERSEN OVEN CO. • 9900 FRANKLIN AVE. • FRANKLIN PARK, ILL.

# DELTA

## SCIENTIFICALLY DEVELOPED *Specialized* FOUNDRY PRODUCTS

*Cut Production Costs*

**DELTA PRODUCTS for the FOUNDRY are PRODUCTS OF RESEARCH**

During the past fifteen years many important scientific developments . . . valuable contributions to the advancement of foundry practices . . . have originated in DELTA'S laboratories where the most modern scientific facilities play a vital part in a continuing program of product research, development and standardization.

Every DELTA Foundry Product was first tested by laboratory methods and then submitted for use and final approval in ACTUAL FOUNDRY PRACTICE before it was identified with the name "DELTA".

From basic raw materials to the finished product every step in the manufacture of DELTA FOUNDRY PRODUCTS is under strict laboratory control in order to maintain absolute uniformity and rigidly protect quality standards.

**THERE IS NO SUBSTITUTE FOR DELTA'S QUALITY CONTROL**

## CORE AND MOLD WASHES:

***FOR STEEL:***

***Delta Special Core & Mold Wash Base*** — Used by more steel foundries than all other types of washes combined.

***Delta SteelKoat,*** a finished high fusion waterproof wash.

***FOR ALL TYPES OF SAND CAST METALS:***

***Delta ThermoKoat*** — It's plasti-lastic, non-heat shocking, highest fusion and hot strength.

***Delta Z-Koat,*** a zirconium wash with unusual properties in contact with molten metal.

***FOR GRAY IRON, MALLEABLE, BRONZE AND BRASS:***

***Delta GraKoat,*** no reaction with molten metal.

***Delta BlacKoat,*** a black wash, free from carbon, no gas in contact with molten metals.

***FOR GRAY IRON:***

***Delta BlacKoat S-5,*** a new and different wash. Produces results, on gray iron castings unequalled by any other wash.

***FOR NON-FERROUS AND LIGHT METALS:***

***Delta NonferrusKoat,*** produces unusually smooth surface castings.

## PARTING COMPOUNDS:

***Delta Partex*** (Nutshell partings) has lycopodium properties, non-injurious and non-hazardous to use.

***Delta Liquid Parting*** — Low cost, highly effective and lasting.

***Delta Sand Conditioning Oil*** — Sticking core sand mixes work freely in core boxes when sand conditioning oil is added to core sand mixes.

## MUDDING & PATCHING COMPOUNDS:

***Delta Sliktite*** — A light colored mud for all types of metal castings.

***Delta Ebony*** — A black mud for gray iron, malleable and nonferrous work. All mudding compounds seal core joints and hold joints together at high temperatures.

## NO-VEIN COMPOUND:

A special compound, not iron oxide. A high hot strength and sand plasticizing material. Stops veins and penetration.

## MOLD SURFACE BINDERS — LIQUID:

***Delta Spray Binders*** — Produce dry sand mold results by surface spraying of green sand molds.

## PERMI-BOND ELIMINATES SEA COAL NUISANCE:

The new modern scientific sea coal replacement.

## BONDITE PRODUCES A REDUCING MOLD ATMOSPHERE:

***For Steel and Gray Iron*** — Use Delta Bondite, a dry binder which becomes waterproof on drying and produces mold atmosphere which is high in reducing gas.

## CORE ROD DIP OIL NO. 224X TIES CORE RODS AND WIRES INTO THE CORES:

Rods and wires coated with Delta Core Rod Dip Oil adhere to the sand. Eliminates need for 50% of the rods and wires and reduces core breakage.

## CORE OILS:

High tensile, low gas, faster baking, exceptionally economical to use.

**Visit us at the Statler Hotel — St. Louis**
during the
**AMERICAN FOUNDRYMEN'S SOCIETY**
**53rd Annual Convention**

# DELTA OIL PRODUCTS CO.

**MILWAUKEE 9, WISCONSIN**

# THIS IS THE ◂COR-BLO▸

## MODEL "D"

### A DUPLEX MACHINE FOR BLOWING LONG SLENDER CORES.

Both heads blow together. The machine is arranged for automatic filling of sand tubes and automatic vibration of core box for drawing. Illustration at right shows front view.

★

Close-up view shows machine adapted to blowing radiator cores. This core box is 8"x36". Machine blows, vents and books the cores.

MAKE A NOTE RIGHT NOW TO

**WRITE FOR CIRCULAR**

## MACHINES AVAILABLE

| | |
|---|---|
| MODEL "B" | *Hand Operated* |
| MODEL "C" | *Automatic* |
| MODEL "D" | *Duplex Automatic* |

# HARRISON MACHINE CO.

*Designers and Builders of Machinery*

**P. O. Box 67** **Wesleyville, Pa.**

# What's Your Bulk Handling Problem?

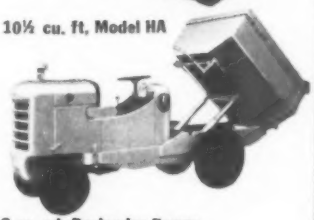
*Foundries use*
**PAYLOADERS**
*to Handle . . .*

**Sand • Scrap**
**Slag • Sprues**
**Coke • Castings**
**Limestone**
**Abrasives**
**Waste • Brick**
**Clay • Chips**
**Borings • Turnings**

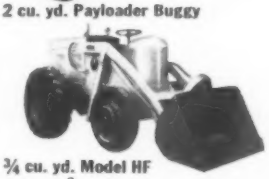
*Model HA Payloader loading a rattler in a Georgia foundry.*

## Unload Box Cars—Carry, Spread and Windrow Sand—Load Trucks—Charge Hoppers—Fill Bins

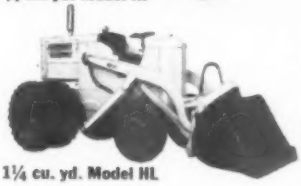
10½ cu. ft. Model HA



2 cu. yd. Payloader Buggy



¾ cu. yd. Model HF



1¼ cu. yd. Model HL

Bulk materials of any kind can become bottlenecks in any plant. They can also "hog" valuable floor space and discourage good plant housekeeping. Makeshift handling methods result in fatigue and physical injuries . . . slow down your operations and raise the cost of your production.

Hough PAYLOADERS are *designed* and built to provide a fast, flexible materials handling system . . . to cut time and costs . . . to boost output per manhour. PAYLOADERS are equipped to increase your production area by reducing your present storage space — to handle the largest loads per operation — to bring neatness into your plant. It's easy to pick up full loads of any bulk material with a PAYLOADER. It's easy to load your materials into hoppers or bins — high or low — by means of its quiet and dust-reducing hydraulic dumping mechanism.

PAYLOADERS also pay an extra bonus by doing many odd chores . . . pushing, pulling, lifting, spotting cars, loading and plowing snow, cleaning yards, leveling waste dumps and grading.

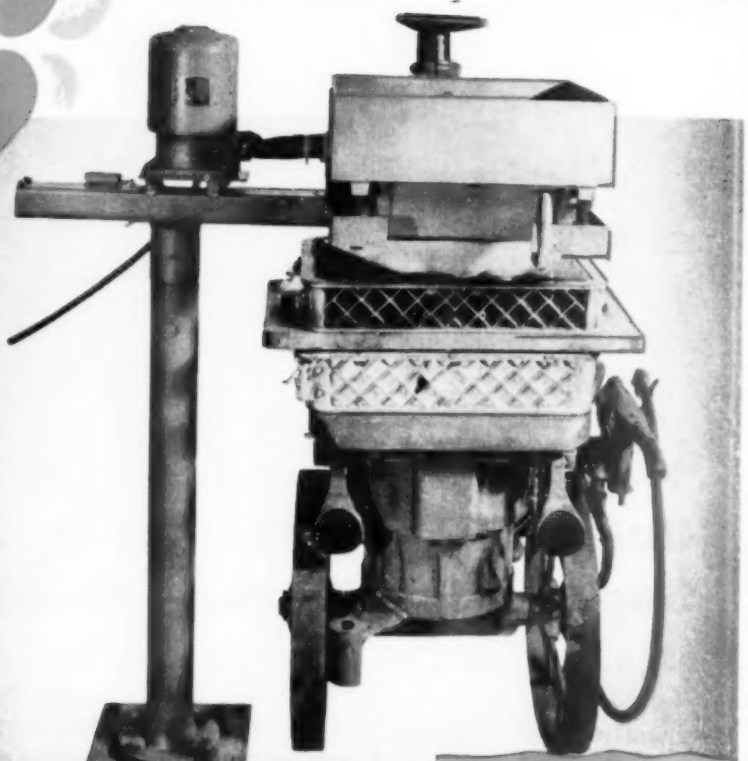
**FREE LITERATURE**
on any units of the complete PAYLOADER line is yours for the asking.

PAYLOADERS are dependable — because they are the result of materials handling experience since 1920.

The Frank G. Hough Co., 703 Sunnyside Ave.
Libertyville, Illinois

**HOUGH**
**PAYLOADER**
Manufactured by THE FRANK G. HOUGH CO.

# WHY RIDDLE YOUR SAND BY HAND?



**Model Illustrated Standard Single Channel $365.00**

**Standard Double Channel $385**

*RIDDLING sand by hand is a familiar, but unnecessarily hard, way to do the job. No molder needs to continue this back-breaking routine that is just one more way to wear himself out by the end of the day.*

THE Roller Riddle, a new product with years of research behind it, in a matter of seconds riddles sand onto the entire surface of the Pattern plate easily and evenly. A special designed 1/4 h.p. motor, combined with a limit switch, automatically activates the riddle basket, oscillating 900 times per minute.

There is no sand wasted and the 31" travel of the riddle on the channel makes the machine highly flexible. Sealed roller bearings throughout. No lubrication necessary. Shaft is covered with tube rubber eliminating the possibility of sand or dirt in the motor.

The Roller Riddle, with a sand capacity of 65 pounds, is not an experiment, but a reality. Machines have been in round-the-clock operation without mechanical failure for over 3,000 hours. Send for our new catalog.

Send For New Descriptive Literature

**ROLLER RIDDLE CORP.**

POST OFFICE BOX 178

PORT HURON, MICHIGAN

# Powder-Cutting

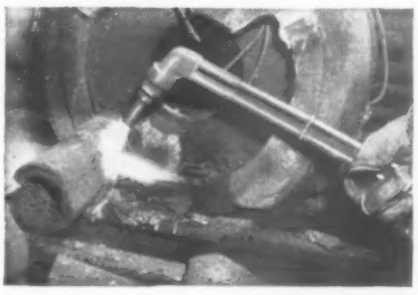
## *Steps Up Production of Stainless Steel Castings 32 Times . . .*

*Centrifugally-cast rings of stainless steel are cut in 15 minutes time, increasing production 32 times.*

Riser cutting of centrifugally-cast stainless steel rings used to be a difficult and time-consuming job. In one foundry which used a boring machine, this operation took eight hours per casting. When powder-cutting was introduced, the time was reduced to approximately 15 minutes—a 32-fold increase in production.

In another foundry, powder-cutting was profitably used to remove ⅜ to 1 in. of metal from stainless steel castings. The machining cost for this type of work has been $24.00 per casting. Substitution of powder-cutting brought the overall cost, including finish-grinding and chipping, to $7.53 per casting, and reduced the time from 8 hours to 1 hour. For an order of 60 castings, the foundry saved $988.20 and 360 hours of operating time.

If you have stainless steel or other oxidation-resistant metals to cut, LINDE's service engineers can show you how powder-cutting methods can be used with profit. Phone or write the nearest LINDE office.



*Here, risers on stainless steel castings are being powder-cut—a time saving of 30 per cent over the former methods.*

Linde
Trade-Mark

**THE LINDE AIR PRODUCTS COMPANY**

*Unit of Union Carbide and Carbon Corporation*

30 East 42nd St., New York 17, N. Y. UCC Offices in Other Principal Cities

In Canada: DOMINION OXYGEN COMPANY, LIMITED, Toronto

The word "Linde" is a registered trade-mark of The Linde Air Products Company

*A note on Abrasives*

# Producing more Abrasives to higher standards ...and what it means to you

In mill, plant and shop, abrasives are continuing to assume greater importance as tools to produce more and better products at lower cost. New technical developments are requiring the use of abrasives in quantities beyond the production capacity of a few years ago. And, new alloys, different materials, faster production techniques and more exacting engineering requirements are calling for improved abrasive products of superior quality. To meet these demands, The Carborundum Company has marshalled all of its specialized technical knowledge, manufacturing resources and service facilities. The bonded abrasive or coated abrasive of today resembles its predecessors of yesterday in general appearance only. It is a different and better tool. It is designed to far more exacting specifications. Its basic ingredients are improved. It is made by newly developed methods. Abrasives by CARBORUNDUM are now produced in larger quantities in new and recently expanded plants to meet our customers' increased abrasive requirements. If you are looking for assurance in obtaining the best in abrasives, and abrasive service, follow this simple rule: specify abrasives by CARBORUNDUM.

The Carborundum Company, Niagara Falls, New York.

**The only complete line of Abrasive Tools is**

**CARBORUNDUM**

TRADE MARK

*"Carborundum" and "Aloxite" are registered trademarks which indicate manufacture by The Carborundum Company*

# Engineering News
## ON ABRASIVE PRODUCTS

### MX Discs and MX Depressed Center Wheels Offer Advantages in Many Applications

Fast cutting...long life...ease in use...and, safety—these are four reasons why MX Discs and MX Depressed Center Wheels by CARBORUNDUM are getting increased use. Their sharp cutting action and extra durability are especially desirable on operations that prove too heavy for ordinary sander discs. They are particularly effective on rough jagged surfaces presenting a severe dressing problem. They are also effective on such jobs as smoothing castings and welds, stock removal and clean-up work, where wearability rather than extreme flexibility is the important factor. They are usable down to practically the arbor hole.

MX Discs and Wheels by CARBORUNDUM are available in 7" and 9⅛" diameters for use on all standard portable disc sanders, air or electric. To obtain maximum safety, full sander pad support is recommended. The D2N.S. sander pad is provided for this purpose.

### Correct Selection of Abrasive Grains Results in Improved Polishing

The abrasive grain is the key to uniform finish in polishing a metal surface. For this reason, different types of abrasives by CARBORUNDUM have been developed, with definite characteristics, to provide efficient performance under varying conditions.

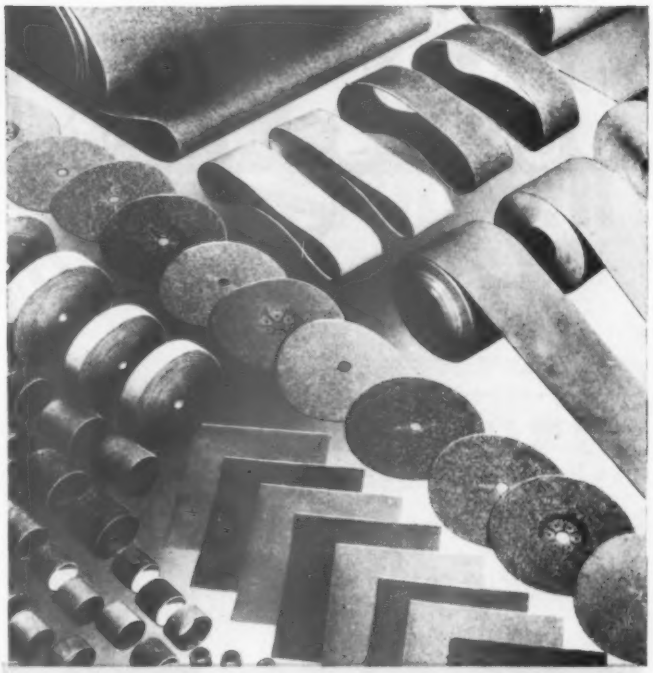
**ALOXITE TP** aluminum oxide grain is tough and blocky. It gives excellent service on operations involving considerable stock removal and is recommended for polishing all types of steel and other metals of high tensile strength.

**ALOXITE TPT** grain is also used where the removal of large amounts of metal is desirable. It is extra tough and sharp, treated to assure effective adhesion with cold cement or glue.

**ALOXITE TPC** grain is of medium sharpness and is treated to assure effective adhesion with cold cement.

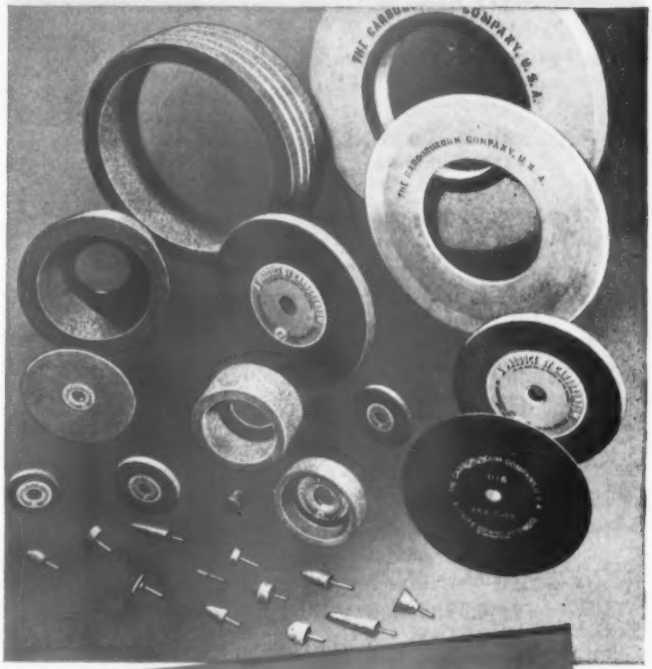
**ALOXITE TPL** is extremely sharp and friable. Due to its friable nature, it fractures during use, constantly presenting new sharp-cutting edges to the work surface. Loading is minimized. It is ideal for polishing metals of low tensile strength.

Accurate grading assures a uniform size, free from oversize material that cause deep scratches, and free from an excess of finer materials that tend to slow production. The angular shape assures maximum cutting edges. Flats and slivers, with no cutting value, are eliminated. Through chemical and physical controls, grains of uniform strength and temper are assured.



**COATED PRODUCTS** — SHEETS • ROLLS • BELTS • DISCS SPECIAL SHAPES

**BONDED PRODUCTS** — ABRASIVE WHEELS • STICKS, STONES AND RUBS • SPECIALTIES • SUPERFINISHING STONES • SPECIAL FORMS • ABRASIVE GRAINS AND FINISHING COMPOUNDS



FOR EVERY ABRASIVE APPLICATION
...CALL IN
**CARBORUNDUM**
TRADE MARK

# "IRONTON NOJOINT" for Foundry Ladles

**IRONTON**
Foundry Representatives

**The Ironton Fire Brick Co.**
Ironton, Ohio

**The Ironton Fire Brick Co.**
Box 4728
Jacksonville 1, Fla.

**Beeman Sales & Engr. Co.**
629 Buhl Bldg.
Detroit 26, Mich.

**Earl A. Swenson**
Box 651
Columbus 16, Ohio

**Firegan Sales Co.**
141 W. Jackson Blvd.
Chicago 4, Ill.

**Henry M. Witmyer**
1311 Proctor St.
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**Pa. Foundry Supply & Sand Co.**
Ashland & East Lewis Sts.
Philadelphia 24, Pa.

**M. D. Lucas**
2116 Keith Bldg.
Cleveland 15, Ohio

**Frederic B. Stevens, Inc.**
93 Stone Street
Buffalo 12, N. Y.

**Carl F. Miller Co., Inc.**
1217 Sixth Ave. So.
Seattle 4, Washington

**Klein-Farris Co., Inc.**
683 Atlantic Ave.
Boston 11, Mass.

**Interstate Supply & Equip. Co.**
647 W. Virginia St.
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**John A. Pruitt**
115 No. 4th St.
Ironton, Ohio

**V. C. Shadden**
Box 935
Chattanooga, Tenn.

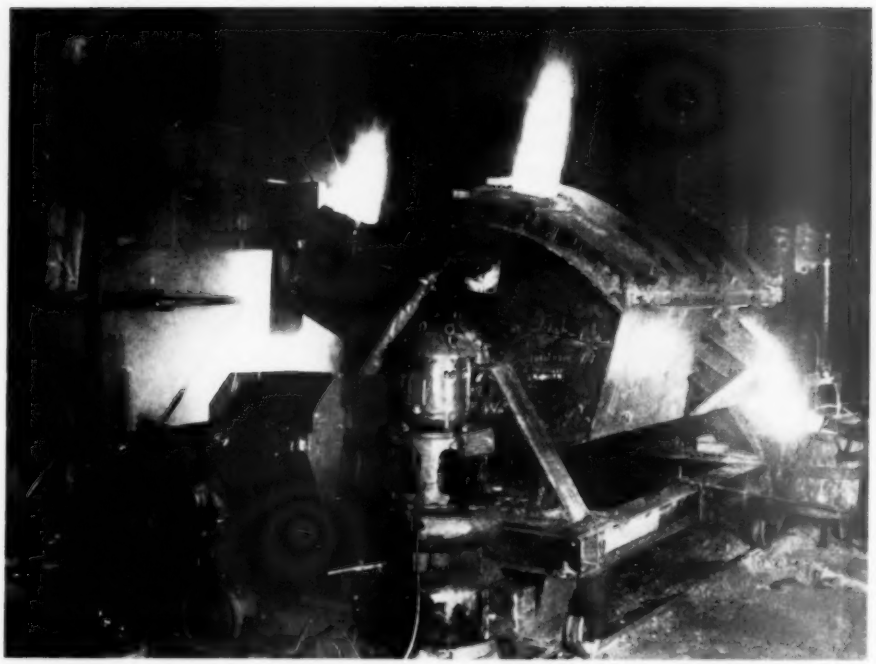


*Photo Courtesy—Whiting Corporation*

**"Ironton Nojoint", special type plastic ramming refractory is giving unusually fine service in these new heated desulphurizing and mixing ladles. It gives considerably longer service than any type of fire brick or special shape lining, due to the solid, dense, monolithic lining being so resistant to soda slags.**

**"Ironton Nojoint" is economical to use and is quickly and easily installed. Our service engineers will be glad to help you.**

**Ask us for complete information on "Ironton Nojoint".**

**THE IRONTON FIRE BRICK COMPANY**
RELIABLE REFRACTORIES
IRONTON OHIO

# How To Lick A Pattern Problem

It's easy. Just call us....We have two complete pattern shops with the finest equipment available. We have designed and built Well-Made wood and metal patterns for a great variety of castings. 37 years' experience.

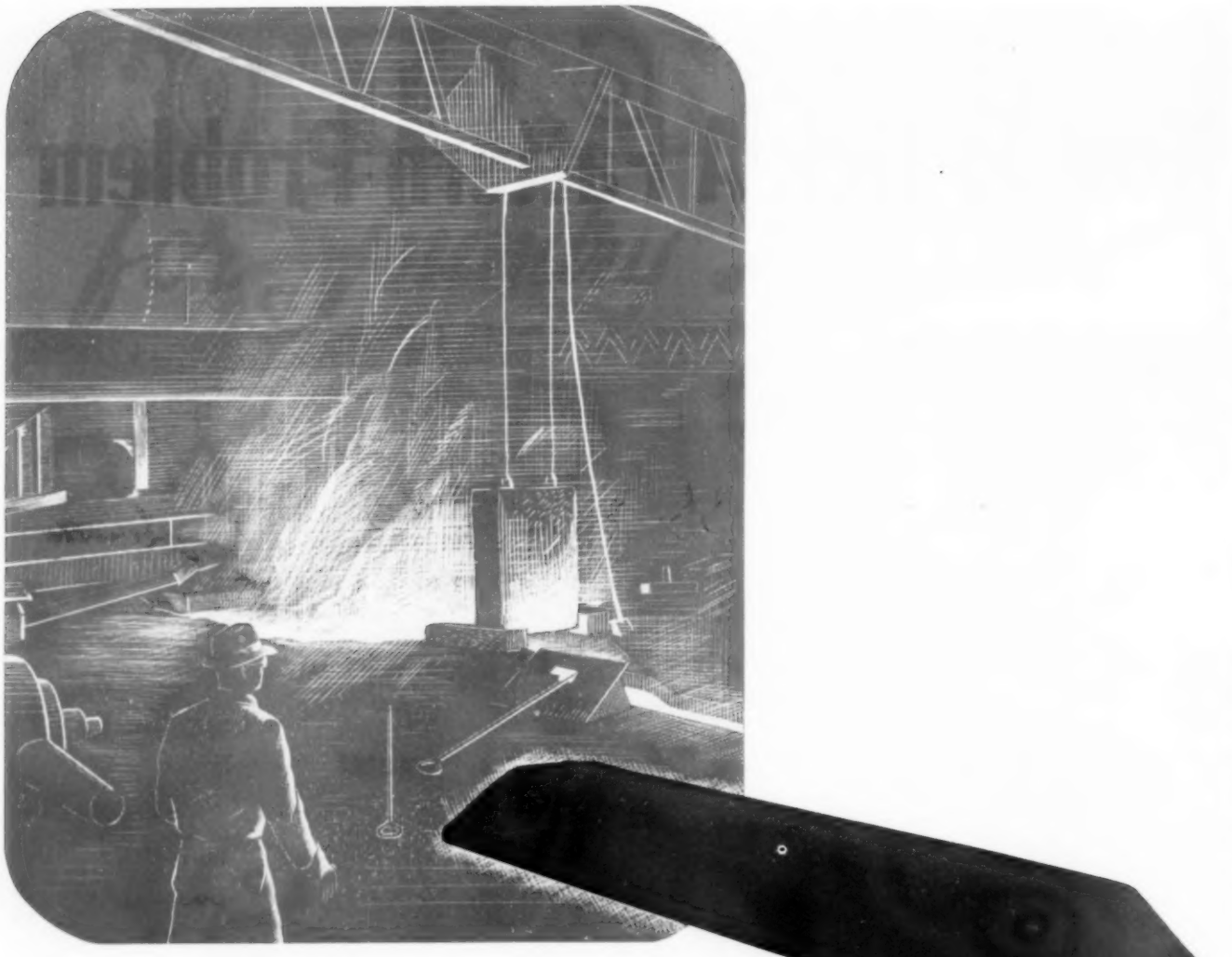
*Send for Catalog No. 47*

THE **WELLMAN**

**BRONZE & ALUMINUM COMPANY**

GENERAL OFFICES: 2502 EAST 93rd STREET
CLEVELAND 3, OHIO

CASTINGS X-RAY INSPECTED



# MEETRITE

## PIG IRON

## Highest Quality

**MORE USED THAN ANY OTHER MERCHANT PIG IRON**

P M

**PICKANDS MATHER & COMPANY**

UNION COMMERCE BUILDING • CLEVELAND 14, OHIO

CHICAGO • CINCINNATI • DETROIT • DULUTH • ERIE • GRAND RAPIDS • TOLEDO
GREENSBORO • INDIANAPOLIS • MINNEAPOLIS • ST. LOUIS • WASHINGTON

IRON ORE • PIG IRON • COAL • COKE

SIXTY-SIX YEARS OF
SERVICE TO INDUSTRY

# Specify CLEVELAND Vibrators

CLEVELAND Type SA matchplate vibrator

| Piston Dia. | Price |
|---|---|
| 3/8" | $ 6.90 |
| 1/2" | 6.90 |
| 5/8" | 7.30 |
| 3/4" | 7.50 |
| 7/8" | 9.50 |
| 1" | 10.60 |
| 1 1/4" | 14.50 |

Type SA pneumatic matchplate vibrators are designed to withstand continuous hard use with minimum maintenance. Low-cost operation, instant starting with full power, minimum number of working parts, low air consumption, and dependability are only a few of their outstanding features.

Type SA vibrators have square, chromed, steel bodies which are borized to a micro-finish. The heat-treated, ground, hard-chrome plated pistons and the anvil type heads are uniformly hardened and resist all tendency to "mushroom".

Specify CLEVELAND Type SA vibrators and you will get top quality vibrators that have been developed and proven by 25 years of experience. THEY ARE GUARANTEED.

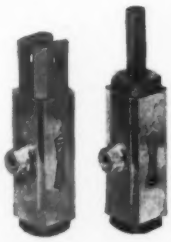
Write for complete catalog.

Type SA vibrator with "Z" swivel connection

## THE CLEVELAND VIBRATOR CO.

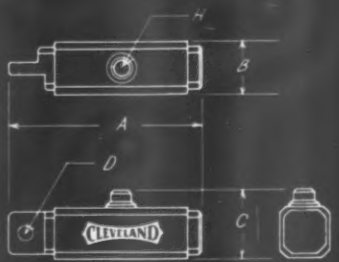
**2789 Clinton Ave., Cleveland 13, O.**

Type SA-D



SA-B SA-E

Alternate attachments available from stock. Prices upon request.




| | TECHNICAL DATA TYPE 'SA' VIBRATOR | PISTON DIAMETER SIZES 3/8" | 1/2" | 5/8" | 3/4" | 7/8" | 1" | 1 1/4" |
|---|---|---|---|---|---|---|---|---|
| A | OVERALL LENGTH | 5 3/16 | 5 3/16" | 5 1/2" | 5 3/8" | 5 3/8" | 6" | 8" |
| B | OVERALL WIDTH | 7/8" | 7/8" | 1" | 1 3/16" | 1 3/8" | 1 1/2" | 1 3/4 |
| C | OVERALL HEIGHT | 1 1/4" | 1 1/4" | 1 1/2" | 1 5/8" | 1 7/8" | 2" | 2 1/4 |
| D | MOUNTING BOLT DIAMETER | 5/16" | 5/16" | 3/8" | 3/8" | 1/2" | 1/2" | 1/2" |
| E | AIR CONSUMPTION PER MINUTE 80# PER SQ IN LINE PRESSURE | 5 CU FT | 52 CU FT | 61 CU FT | 66 CU FT | 7 CU FT | 7.5 CU FT | 8.5 CU FT |
| F | VIBRATIONS PER MINUTE | 5100 | 4950 | 4650 | 4000 | 3600 | 2100 | 1950 |
| G | WEIGHT | 1# | 1# | 1# 3 oz | 1# 10 oz | 2# 6 oz | 2# 13 oz | 5# 4 oz |
| H | NATIONAL PIPE THREAD SIZE OF INTAKE CONNECTION | 1/8" | 1/8" | 1/8" or 1/4" | 1/8" or 1/4" | 1/8" or 1/4" | 1/8" or 1/4" | 1/2" |
| | APPROXIMATE VIBRATOR SIZE REQUIRED FOR VARIOUS SIZED PLATES WITH AVERAGE DRAW | 8" X 10" TO 10" X 12" | 10" X 12" TO 12" X 14" | 12" X 14" TO 14" X 16" | 12" X 16" TO 16" X 20" | 20" X 24" TO 24" X 28" | 24" X 28" TO 28" X 30" | 28" X 30" TO 36" X 36" |

# PRESENTING THE NEW...

SIMPSON
T. M.
REG. U.S. PAT. OFF.

## Porto-Muller

**NATIONAL ENGINEERING CO. Chicago, Ill.**

***. . . offering these outstanding advantages for all types of foundry sand:***

- **LOWEST COST MIXER** of its size and type available today.
- **100% PORTABLE and SELF-CONTAINED**—no hoists or ceiling supports required.
- **EASY TO HANDLE**—rolls on standard 6.00 x 16 implement type tires and wheels, with sealed grease-packed anti-friction bearings.
- **BIG CAPACITY**—easily handles 250 to 300 lbs. of sand.
- **STANDARD MOTOR**—3 H. P., 1800 R.P.M. motor, interchangeable with any NEMA Frame Motor.
- **ADJUSTABLE MULLERS**—Spring adjustment preloads mullers within a range of 100 to 275 pounds, to provide correct muller weight for all types of sand.
- **SIMPLE V-BELT DRIVE**—Efficient operation, protects reduction unit against sudden impacts from tramp iron, etc.
- **READY TO GO**—Fasten adjustable handles, connect female plug attached to unit to any outlet, using cable and male plug furnished with mixer, and you're ready for the sand.
- **PROVED IN USE**—"Porto-Mullers" have been tested and proved right on the floors of leading foundries. Backed by the reputation of thousands of larger Simpson Mixers now in service.

***ABOVE: Note compact, clean design of the new "Porto-Muller." RIGHT: This view shows the simple, compact yet rugged construction of the adjustable muller weight feature, plow and bottom discharge door . . . which gives unit fast discharge, and makes it virtually self-cleaning.***

## NATIONAL ENGINEERING COMPANY

**608 MACHINERY HALL BUILDING • CHICAGO 6, ILLINOIS**

# A Low Cost PORTABLE MULLER...*that rolls right up to the SAND PILE!*

Now you can have a rugged, low cost, compact mixer "package" that is completely self-contained and 100% portable . . . No auxiliary hoists or ceiling supports are required! This new Simpson "Porto-Muller" is easily rolled over rough, uneven floors on its big, pneumatic implement type tires . . . right up to the sand pile for quick loading and mulling.

Because of the experience gained in the performance of thousands of Simpson Mixers in the foundry industry, the "Porto-Muller" offers you adjustable muller weights, so that in a few seconds you can select the weight most suitable for the slickest core sand mix or the toughest steel sand facing.

Look at the outstanding "Porto-Muller" features listed at the left, and then have a National Engineer show you how this versatile muller can increase both the quantity and the quality of your castings at lower cost.

For complete details, send for Bulletin 491.

***ABOVE: The Simpson "Porto-Muller" is a cinch to load. Just wheel it over to the sand pile, tilt in position as shown, and toss in your sand.***

***BELOW: If conditions warrant, it's also simple to load from a wheelbarrow.***

***LEFT: Simpson "Porto-Muller" discharging batch into wheelbarrow. Note compactness and low over-all size of mixer. When desired, wheelbarrow operation can be eliminated by rolling the unit right to any desired location.***

SIMPSON
Intensive
MIXERS

Manufacturers and Selling Agents for Continental European Countries — The George Fischer Steel & Iron Works, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia — August's Limited, Halifax, England. For Canada — Dominion Engineering Co., Ltd., Montreal, Canada. For Australia and New Zealand — Gibson, Battle & Co., Pty., Ltd., Sydney, Australia

# DEMMLER Core Blower

## NO. 55

### A FAST CORE BLOWER EVERY FOUNDRY NEEDS AND CAN AFFORD

Because of its many features, the new Demmler No. 55 Core Blower was quick to gain popularity with foundrymen everywhere. This versatile machine will accommodate boxes 9 inches long—handle cores weighing up to 3 pounds. Sand magazine opening is 4½ by 9½ inches. A single hand valve operates both vertical and horizontal core box clamps and blows the core. Only 3 seconds required for complete cycle!

### IDEAL FOR SHORT RUN JOBS

Among the many high quality features found on the new DEMMLER No. 55 are:

1. **Quick, easy adjustments for raising the table and moving chuck jaws.**
2. **Sliding, quick change blow plates**
3. **Trouble-free diaphragm type blow valve**
4. **Sand magazine and carriage of aluminum castings, with ball bearing rollers**

Very reasonable in price, the DEMMLER No. 55 is the economical solution to the rapid production of high quality small cores—an ideal machine for any foundry whether large or small.

**Wm. Demmler & Bros.**

**KEWANEE, ILLINOIS**

***SEND FOR ILLUSTRATED SPECIFICATION SHEET***

# HERE'S HOW...

## CHICAGO TRANSIT AUTHORITY CUTS MELTING TIME IN HALF

**. . . cuts fuel cost 50% . . . cuts metal losses 40%**

Chicago Transit Authority, one of the world's largest transportation systems, operating 2,400 streetcars, 1,625 elevated cars, and 1,100 buses, installed a Fisher oil fired Simplex Melting Furnace for remelting, reclaiming scrap, brass, and bronze. Journal and axle bearing brasses and worn parts from all types of rolling stock are melted down and recast into new parts.

The new Fisher Simplex replaces a conventional oil fired spherical type open flame furnace. Check this "Before and After" story of faster melting, lower fuel cost, and lower metal losses.

| | BEFORE | AFTER |
|---|---|---|
| Heating time 1000 lb. charge | 2½ hrs. | 1 hr. |
| Fuel cost per pound melted | $.0056 | $.0027 |
| Metal Loss | 5% | 3% |

**FISHER ADVANTAGES**

Furnace charges *easily* from front at convenient height. . . . More scrap can be charged because of large area above molten metal line. . . . Uses open flame reverberatory melting, the *fastest* fuel fired melting method. . . . Two section furnace shell removable for *easy* relining.

*Ask for bulletin #28-A "Fisher Simplex Furnaces."*

*Fisher Furnaces*

**A DIVISION OF LINDBERG ENGINEERING CO.**

**2453 West Hubbard Street, Chicago 12, Illinois**

"THE IMPORTANCE OF SIZE DISTRIBUTION OF THE PARTICLES ON THE PROPERTIES OF MOLDING OR CORE SANDS IS WELL KNOWN IN FOUNDRY PRACTICE."

*from* **THE FOUNDRY . . .** ***February 1949****

# *Lancaster*

# *Mixers*

* "LANCASTER" MIXERS DO NOT ALTER OR DESTROY THE PHYSICAL CHARACTERISTICS OF THE PARTICLES AND RETAIN IN FINISHED MIXES THE DESIRABLE QUALITY OF UNIFORMLY DISTRIBUTED PARTICLE SIZES, BOND, AND LIQUID ADDITIONS.

***from the experience of* "LANCASTER" MIXER *users.***

One of the surest aids available to foundry men for proper particle distribution in sand mixing, is the use of "Lancaster" Mixers. The "Lancaster" system creates a compulsory movement of particles as well as all materials of the batch, thus mechanically promoting — with dependability — the qualities required in finished mixes. And it does this thoroughgoing job with economies, too . . . (1) economy in power (2) economy in maintenance (3) economy in bonding agents.

"Lancaster" Mixers charge fast . . . mix fast . . . discharge fast . . . clean quickly. Select from a range of 3 laboratory unit sizes and 4 production sizes in 19 models.

Literature available on request, without obligation. Write today.

## POSEY IRON WORKS, INC.

*formerly* LANCASTER IRON WORKS, INC.

BRICK MACHINERY DIVISION

LANCASTER, PENNA., U.S.A.

# Bulletin on SUPER REFRACTORIES

by CARBORUNDUM
TRADE MARK

NO. 2 MAY, 1949

## Job-Fitted Super Refractories

Industry currently uses many different types of furnaces and kilns. In their operation, a wide range of conditions is developed. Even in similar furnaces handling comparable products, conditions seldom are identical.

A complexity of refractory requirements naturally results. That's why a large variety of refractories is needed. It explains the availability of numerous kinds.

Diversity is even more essential in super refractories. Intended for use in specific areas of manifold installations, they must offer a broad range of special properties. Hence, no single super refractory is suitable for all jobs. The need for a group of super refractories is quickly evident.

The line of Super Refractories by CARBORUNDUM includes several distinct basic materials. They are silicon carbide, aluminum oxide, mullite—all electric furnace products. They possess separate and unique characteristics of value in particular types of applications. Through bond modifications and grain sizings, each class of material also consists of many varieties. In this way certain properties are enhanced to better meet varied requirements.

That's the reason Super Refractories by CARBORUNDUM are so aptly described as "tailor-made" products. They are engineered for the job. So, it's only natural that they give greatest service at lowest possible cost.

### Physical Properties of Super Refractories by CARBORUNDUM
TRADE MARK

| | CARBOFRAX | MULLFRAX | MULLFRAX S | ALFRAX K | ALFRAX B | ALFRAX BI |
|---|---|---|---|---|---|---|
| Heat Conductivity at 2200°F. in BTU/hr. sq. ft. and °F. /in. of thickness | 109 BTU | 16 BTU | 9 BTU | 24 BTU | 12 BTU | 7 BTU |
| REFRACTORINESS PCE CONE | 37-40 | 38-39 | 37-38 | 37-39 | 39-40 | 38-39 |
| SPALLING RESISTANCE | High | High | High | Good | Good | Good |
| ABRASION RESISTANCE | High | Medium | Medium | High | Medium | Low |
| THERMAL EXPANSION (25°—1400° C.) | .0000044 | .0000059 | .0000069 | .0000074 | .0000086 | .0000086 |
| MODULUS OF RUPTURE @ 2460° F. PSI | 800-3125 | 100-250 | 175-475 | 100-1050 | 100-225 | 50-100 |
| WEIGHT 9 IN. STRAIGHT | 9.25 lbs. | 9 lbs. | 8 lbs. | 10.1 lbs. | 7.25 lbs. | 4.8 lbs. |

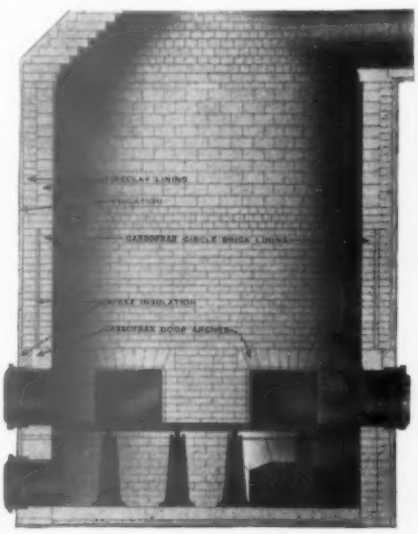
### Ceramic Kiln Utilizes Job-Fitted Super Refractories

In this straight-line tunnel kiln, CARBOFRAX silicon carbide tile, installed in the firing zone, assure rapid and uniform heat conductivity, freedom from cracking, high strength and outstanding refractoriness.

ALFRAX aluminum oxide muffle tile, adjacent to firing zone, provide chemical stability, resistance to high temperatures and thermal conductivity about four times that of fireclay.

In the balance of the muffle structure, MULLFRAX S converted kyanite tile offer high resistance to spalling...are unaffected by kiln atmosphere. Their low heat conductivity gives requisite temperature uniformity in the preheat zone.

The use of this combination of super refractories tailored to specific conditions results in extended service life and higher production.



### Advantages Realized in Selecting The Right Super Refractories

Gas generators usually show lower operating costs when they are lined with CARBOFRAX silicon carbide brick. Among other advantages, the basic

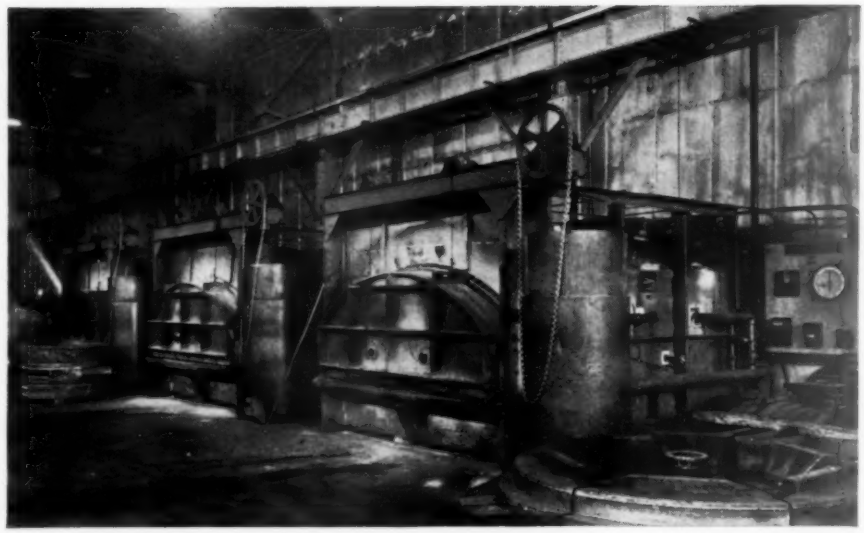
*"Carborundum," "Carbofrax," "Mullfrax," "Silfrax," "Alfrax" are registered trademarks which indicate manufacture by The Carborundum Company*

Address all correspondence to: Dept. D-59, THE CARBORUNDUM COMPANY, Refractories Division, Perth Amboy, New Jersey

**Continued on other side →**

← Continued from other side

characteristics of this material provide greater gas make at less cost per MCF of gas produced, a 30 to 50% reduction in down time for cleaning and longer life per dollar invested. These benefits are realized in more than 350 installations...*even though variations in fuel and operating methods exist from plant to plant.* The answer is found in the experienced selection and application of modified varieties of CARBOFRAX linings where required to meet conditions encountered in specific installations.



## Doubling Skid-Rail Service

These gas-fired furnaces are used to heat-treat steel rings for ball-bearing raceways and rims for large truck wheels. Some of the parts treated weigh as much as 800 pounds. Operating temperature is 1650° F.

Under these conditions, CARBOFRAX silicon carbide skid rails now give more than a year's service where alloy rails failed in less than six months. Warpage and deformation have been eliminated. Repair and replacement time have been saved. Lost production time has been salvaged. Over-all savings, increased production and completely satisfactory performance fully justify job-fitted super refractories in this installation.

## Super Refractories Job-Fitted to Enameling Furnaces

Reduced fuel consumption, increased production of quality ware and more uniform operating temperatures resulted from the application of Super Refractories by CARBORUNDUM in this continuous enameling furnace.

Several types of super refractories are required to realize best service under varying conditions of different furnace zones. Side walls and hearth are made of two different varieties of CARBOFRAX silicon carbide tile. Side-rails are made from ALFRAX aluminum oxide tile. Support arches and pier facings are made from still another variety of CARBOFRAX super refractory material.

Each of these special super refractories contributed its unique characteristics to the whole structure... was fitted into the job where these characteristics would provide the greatest benefits.

## Job-Fitted Super Refractories Being Fitted for the Job

Section of CARBOFRAX silicon carbide dome for muriatic acid furnace

assembled for checking purposes before shipment. Replacing fireclay, these CARBOFRAX domes step-up production by two and more times without increasing fuel consumption. This is made possible by the high thermal conductivity and emissivity of CARBOFRAX shapes. Their exceptional hot strength and resistance to flame erosion assure long life and freedom from frequent repair and replacement.

A complete file of informative literature covering super refractories is available through The Carborundum Company. There are facts and figures on installations in specific fields. To obtain copies of reports, booklets and catalogs of particular interest is a simple matter. Merely select from the list printed here. Copies will be sent you at once. No obligation, of course.

Super Refractories by CARBORUNDUM (general catalog)

Super Refractories for the Ceramic Industry

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# How to Make Parting Easier...

## *in the foundry, that is!*

Use **"dag"** colloidal graphite dispersions for coating chills, patterns, and permanent molds.

Applied easily by spray or brush, **"dag"** dispersions provide a micro-thin colloidal graphite film that does not affect casting or mold thickness, and greatly improves surface quality. They will also eliminate or reduce the smoke usually caused by parting compounds . . . a definite advantage for the men in the shop.

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*Coating a permanent mold with "Aquadag" at the Wisconsin Aluminum Foundry Company, Inc., Manitowoc, Wisconsin. "Aquadag" is the* ***"dag"*** *colloidal dispersion of graphite in distilled water.*

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# AO No. 306-No. 308 DUST GOGGLES

*For Dusty Work...*
*(Especially in Cement Plants and Compressed Air Operations)*

**AO Suggests No. 306 and No. 308 Dust Goggles**

When fine dust particles and powders endanger the eyes, workers find these goggles a welcome help and protection. Identical except for a difference in mask size to fit both large and small faces, they feature a special screen of 150 mesh wire behind a 16 mesh screen which shuts out the dust. This wire screen construction around eyecups also provides adequate ventilation and controls fogging of lenses. Sparks and flying particles cannot reach eyes. Mask is flexible leather, bound at the edges with soft corduroy for comfort and close fit. Rubber headband keeps goggle in place. Either goggle may be comfortably worn with a respirator. 50 mm. Super Armorplate or 6 Curve Super Armorplate clear or Calobar lenses. Medium, dark or extra dark shades. Your nearest AO Safety Representative can demonstrate the effectiveness of this goggle.

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# *This master pattern must have* Dimensional Stability

Typical of the aircraft manufacturers who demand dimensional stability in their patterns is Northrop Aircraft, Inc. Northrop used many tons of HYDROCAL* Gypsum Cement to build master patterns of the three-engined C-125 Raider, now in production for the U.S. Air Force at their Hawthorne, California, plant.

HYDROCAL was chosen for this job because of its outstanding dimensional stability. HYDROCAL Gypsum Cement is accurate and fast to work, and is not affected by normal shop changes in temperature and humidity. With HYDROCAL, irregular and unusual shapes, complex contours, are easily attained.

Once a HYDROCAL pattern is completed, it is always ready for use. HYDROCAL Gypsum Cement patterns can be used without major repairs after many years of storage.

HYDROCAL patterns will not shrink or swell, and under proper conditions of pattern shop use and storage will not warp.

Use the *most stable* patternmaking material. Use HYDROCAL Gypsum Cement. HYDROCAL, product of United States Gypsum, can be adapted to almost every job in your pattern shop.

*HYDROCAL is a trademark Reg. U. S. Pat. Office for a super-strength gypsum cement manufactured by U. S. Gypsum Co.

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- ☐ IGL-103, How to Make Pattern Stock with HYDROCAL Gypsum Cement
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- ☐ IGL-106, HYDROCAL Gypsum Cement Combined and Blended Shapes
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## actual monthly saving by using HY-TEN CORE OIL 304 !

A Southern foundry adopted this low-cost, high-quality core oil at a saving of 47 cents per gallon, which in one month totaled $387.00. That's economy!

It found it could speed up baking time and produce excellent cores. No wonder that foundry — and so many others — have standardized on Hy-Ten . . . free from gassing, smoking or sticking . . . easy shake-out . . . low scrap loss. For test, write —

**E. F. HOUGHTON & CO.**

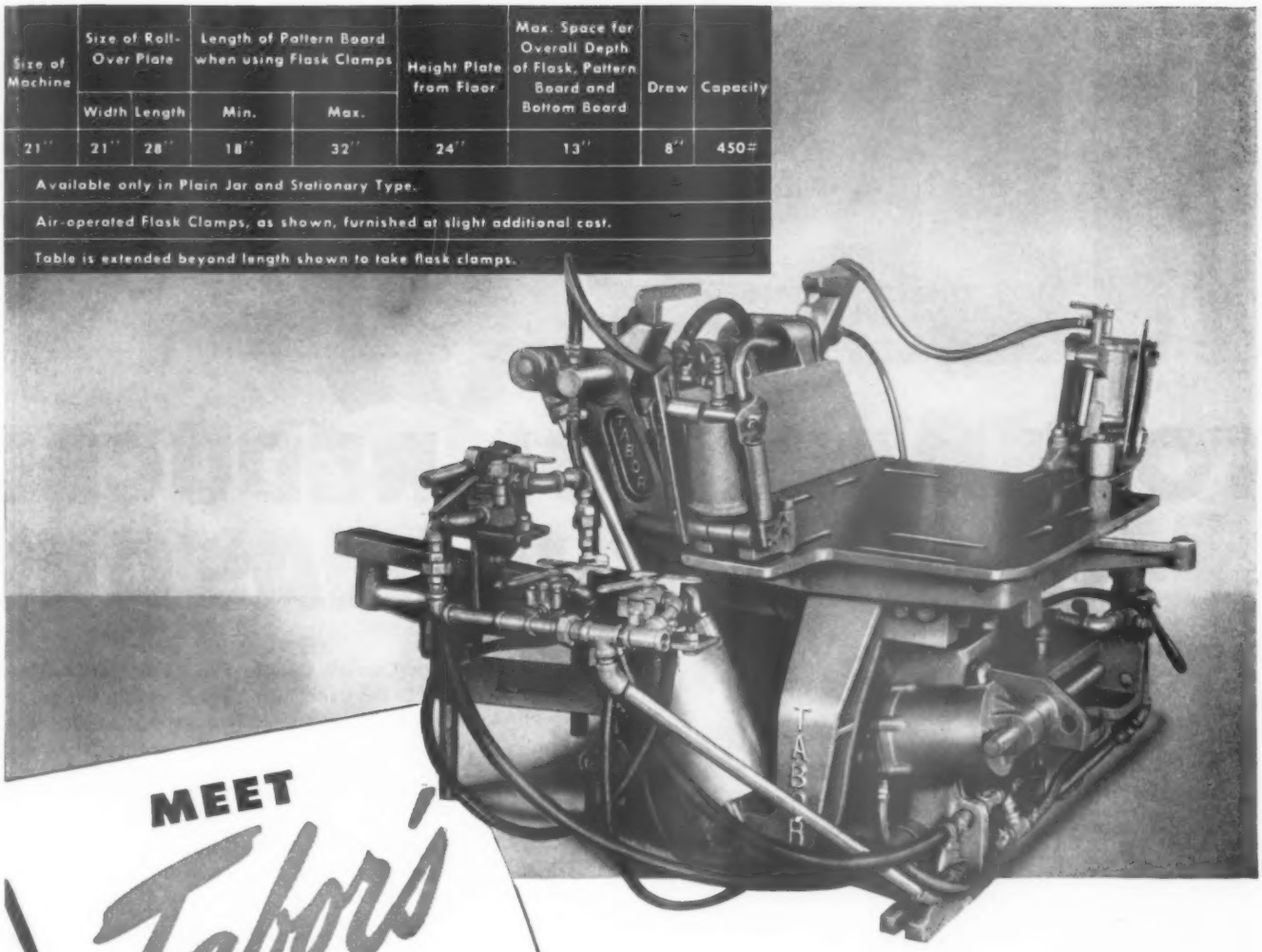
303 W. Lehigh Avenue, Philadelphia 33, Pa.

| Size of Machine | Size of Roll-Over Plate | | Length of Pattern Board when using Flask Clamps | | Height Plate from Floor | Max. Space for Overall Depth of Flask, Pattern Board and Bottom Board | Draw | Capacity |
|---|---|---|---|---|---|---|---|---|
| | Width | Length | Min. | Max. | | | | |
| 21" | 21" | 28" | 18" | 32" | 24" | 13" | 8" | 450# |

Available only in Plain Jar and Stationary Type.

Air-operated Flask Clamps, as shown, furnished at slight additional cost.

Table is extended beyond length shown to take flask clamps.




# MEET Tabor's NEW ROLLOVER ...small and completely power-operated

Tabor, foremost name in foundry molding machines, shows the way again—to completely power-operated production of small or medium-sized molds and cores.

It's wrapped up in a rugged, well-designed machine—our new 21" Rollover. Air-operated clamps grip the flask. A powerful cylinder Jar-Rams the mold. Rollover and drawing operations are power controlled. Air-operated leveling device insures a perfect, right-angle draw.

No foundryman can afford not to utilize the advantages—in upped production, in reduced operator fatigue—made possible by this machine. It's described fully in the new Rollover Bulletin No. 494—just off the press. Write for your copy. And if you need further details or assistance, you'll find Tabor on the job.

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Snyder Foundry Supply Company, Los Angeles, Calif.; The Pacific Graphite Company, Inc., 40th & Linden Sts., Oakland 8, Calif.; Carl F. Miller & Company, Seattle, Washington; M. W. Warren Coke Company, 1017 Olive Street, St. Louis 1, Mo.; E. R. Frost Company, Inc., Minneapolis 14, Minn.; Harry H. Reich, Trussville, Ala.

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SINCE 1884 MANUFACTURERS OF FOUNDRY MOLDING MACHINES
6225 TACONY STREET • PHILADELPHIA 35, PENNA.

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## TO DEMAND FOR REDUCED C
## CLEANER CUPOLAS AND R

*Famous*
**CORNELL**
**CUPOLA FLUX**
**IN SCORED BRICK FORM**

This exclusive form makes the cost of fluxing molten metal with Famous Cornell Cupola Flux surprisingly low. No digging out of container. No weighing, no measuring.

You simply toss Famous Cornell Cupola Flux into your cupola with each ton charge of iron or break off one to three briquettes (quarter sections) for smaller charges. Unlike flux in other forms, it does not blow out with the blast but STAYS in melting zone until entirely consumed, thus insuring fullest efficiency.

Famous Cornell Cupola Flux is a metal cleanser PROVED by over thirty years of continuous success in maintaining higher casting standards and lower costs in leading foundries throughout the United States and Canada.

**The Results that Pay Off**

Molten metal is purged of slag and other impurities, is amazingly free from sulphur, and is hotter and more fluid.

You pour castings that are denser grained, stronger, cleaner—chilled sides, hollow centers, etc. are greatly reduced.

Machining is definitely easier and smoother.

Your cupolas are cleaner, bridging over is greatly reduced, drops are cleaner and, by reducing erosion, Famous Cornell Cupola Flux increases the life of cupola lining. Furthermore, maintenance time and labor is cut amazingly.

**MALLEABLE FOUNDRIES with Cupola Operation** are not only giving their castings a better start with clean metal but are enjoying big savings in cupola maintenance. Famous Cornell Cupola Flux keeps cupolas cleaner. It reduces bridging over to a great extent, insures cleaner drops, and forms a glazed or vitrified surface on the brick or stone lining, which reduces erosion and prolongs the period between patching or replacement.

*Famous* **CORNELL ALUMINUM FLUX**

Cleanses molten aluminum so that you pour clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections can be poured. Castings take a higher polish. Working conditions are improved due to Exclusive Formula which greatly reduces obnoxious gases. The dross does not contain any metal after this flux is used.

Mfrs. of IRON, SEMI-STEEL, MALLEABLE, BRASS, BRONZE, ALUMINUM, and LADLE FLUXES -- Since 1918

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## CASTING MAKE-OVERS, REDUCED MAINTENANCE

**WRITE FOR BULLETINS**

**No. 46-B for Molten Iron.** **No. 46-A for Brass and Aluminum.**

### *Famous* CORNELL BRASS FLUX

Cleanses molten brass even when dirtiest brass turnings or sweepings are used. You pour clean, strong castings which withstand high pressure tests and take a beautiful finish. The use of this flux saves you considerable tin and other metals, and keeps crucible and furnace linings cleaner, adds to lining life and reduces maintenance.

**FLUX** *Company*

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FAMOUS CORNELL FLUXES
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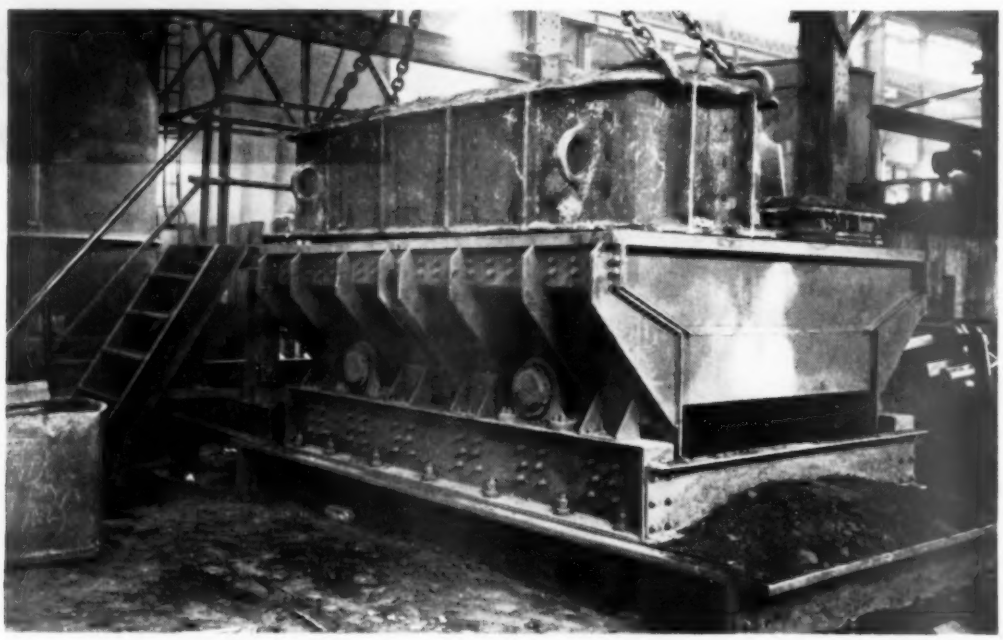
# When You Want Both FLASK SHAKEOUT and CORE KNOCKOUT

**With One Machine . . .**
**In One Operation**

## pick SIMPLICITY as 800 foundries have during the past 15 years!



• It is nothing new to owners of Simplicity Shakeouts. Whenever they wish to shakeout castings and knockout cores in a single operation they can do it with a Simplicity—and they have been doing it with a Simplicity for the past 15 years! Shown here is a typical Simplicity Shakeout, a Heavy Duty 8 x 10 unit in operation. Our engineers will gladly recommend the proper Simplicity Shakeout for your foundry operations on receipt of your specifications.

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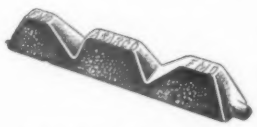
# SNIP . . . AND IT'S YOURS!



"Copper-Base Casting Alloys" is a 52-page book published for you by Federated Metals.

It discusses the metallurgy and practical behavior of high copper alloys, tin bronzes, red brasses, yellow brasses, manganese bronze, nickel silver, aluminum bronze, silicon bronze and silicon brass.

It brings you the vast knowledge of the Federated research and service staffs on such important subjects as thermal effects, shrinkage porosity and gas porosity. It includes a handy compilation of industry specifications . . . ASTM, AMS, SAE, Federal, U. S. Navy, and others.

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Hines

*Made In*

**CAST IRON OR ALUMINUM**

Fully Protected by Patents and Patents Pending

# Put to the TEST . . . . .

# THE HINES

3431 WEST 140th ST.

# Jackets

A few typical applications of Hines Jackets are illustrated here. Machined to a smooth, flat surface inside, they fit the mold so closely that the use of weights is held to a minimum and in some cases eliminated. Available in either "slip" or "Pop-Off" styles.

## ...and Proved the BEST

# FLASK CO.

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# TOP-QUALITY ELECTRODES ARE EASY TO RECOGNIZE . . .

The ‹IC› trademark stamped in the socket identifies top-quality electrodes immediately and signifies the most progressive methods known in the art of producing graphite electrodes. For at International, all phases of the manufacturing cycle are carefully controlled to assure the most desirable characteristics . . . electrodes and nipples are checked chemically and mechanically for top-quality and uniformity . . . threads are "miked" to eliminate misfits. There are no better graphite electrodes than International . . . none better for performance . . . none better for economy, that's why so many melters use them consistently.

*Graphite products for electrothermic and electrolytic applications*

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# "One veteran worker can distribute approximately 20 tons of sand a day"

**. . . states the Buffalo plant manager, Allegheny-Ludlum Steel Corporation**

## The BELL Prime Mover*

● In foundries, as well as in other plants, Bell Prime Movers give older workers a new lease on their jobs. They save money, too. At Allegheny-Ludlum, the Prime Mover saves up to $200 a month in direct labor . . . hauling sand in its big bucket.

Not only can Prime Movers earn back their first cost on "wheelbarrow" jobs, but they have other uses . . .

It takes only a moment to lift off the giant bucket and drop a steel platform body into place . . . either 9- or 14-square-feet . . . converting the Prime Mover to a half-ton truck of great mobility and usefulness.

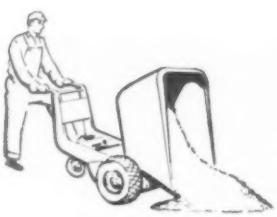
Still greater versatility results when a 50-inch steel blade is bolted to the chassis . . . useful for plowing snow, pushing sand, or light grading.

Prime Movers are valuable for two-level foundry layouts with ramps or elevators. For example, at the Bronx Brass Foundry, Inc., the Prime Mover transfers sand from the basement to the first floor. Here the ramp-grade is between 26 and 30 per cent. In two trips with the Prime Mover, one man does as much as two men could do in four trips with ordinary wheelbarrows.

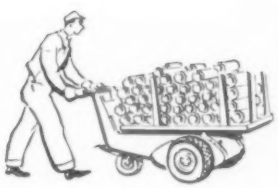
Impressive as these two examples may be, it still takes an on-the-job demonstration to illustrate the Prime Mover's remarkable adaptability to foundry duties. If you would like to see such a demonstration, we'll gladly arrange one. For information, please sign this coupon and mail it to us.

### FEATURES:

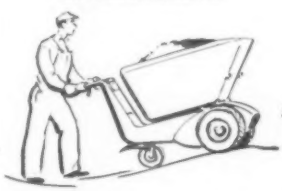
Bucket holds 10 cubic feet . . . 18 with sideboards



Mechanically dumped . . . operates by foot pedal

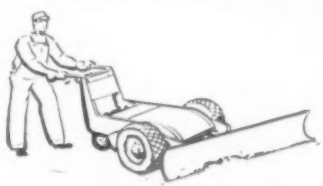


9- or 14- square-foot steel platform takes half-ton loads



Climbs 20% grades fully loaded

50-inch steel blade makes Prime Mover an efficient snow plow



- Gear driven . . . no belts or chains.
- Fully enclosed engine protected against dirt and moisture.
- Clutch, engine, transmission all run in oil.
- Switch from bucket to platform without tools . . . in less than a minute.
- Turns in its own length (63½"); width 31½".
- 3-gallon tankful of fuel gives 8 hours continuous service.

A PRODUCT OF **BELL** *Aircraft* CORPORATION

*PATENTS & T. M. REG. PENDING. COPYRIGHT, 1949

**MAIL COUPON TODAY**

Bell Aircraft Corporation
P. O. Box 1D5, Buffalo 5, N. Y.

Please send me facts on the Bell Prime Mover. Who is the nearest distributor?

*Name*.....

*Company*.....

*Address*.....

*City, Zone & State*.....

# Producing Thin Section

**1 Adding FERROCARBO Briquettes to cupola charge.** Processed and packaged for handling ease, the addition of the briquettes is a simple operation.

**2 Iron flowing from cupola to air furnace.** FERROCARBO Briquettes are a widely accepted agent for obtaining thorough deoxidation.

# Malleable Iron Castings

A fluid iron is required to obtain optimum results in producing thin section malleable castings. When FERROCARBO silicon carbide Briquettes are used in the cupola charge, fluidity is prolonged. Product performance is improved. Scrap loss is reduced. Castings, like the ones illustrated here, are the result.

Because of this experience, considerable attention is being directed to the use of FERROCARBO Briquettes in malleable operations. Complete details can be obtained from our metallurgists.

## FERROCARBO Briquettes

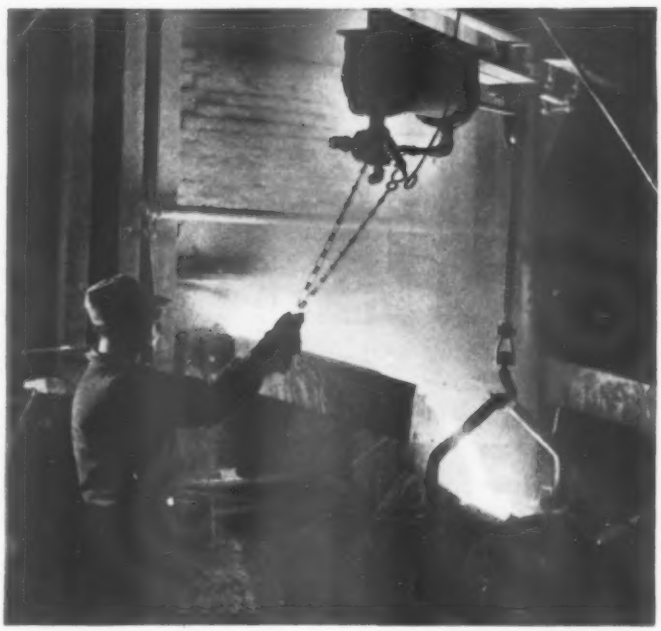
BY CARBORUNDUM

TRADE MARK

**THE CARBORUNDUM COMPANY, Bonded Products and Abrasive Grain Division, Niagara Falls, New York**

FERROCARBO Distributors: Kerchner, Marshall & Co., Pittsburgh, Cleveland, Birmingham, Philadelphia and Buffalo; Miller and Company, Chicago, St. Louis and Cincinnati

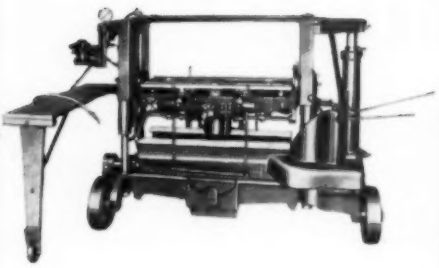
*"Carborundum" and "Ferrocarbo" are registered trademarks which indicate manufacture by The Carborundum Company*



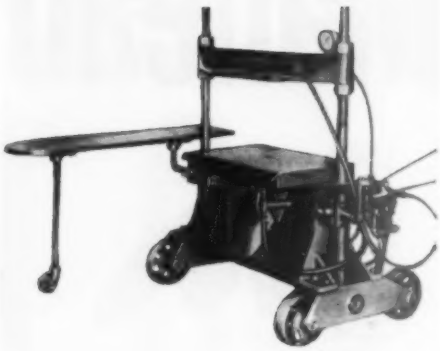
**3** **Tapping air furnace.** FERROCARBO Briquettes provide prolonged increases in fluidity.

**4** **Pouring a casting.** There are less shrinkage cracks and hot tears close to or where risers feed castings.

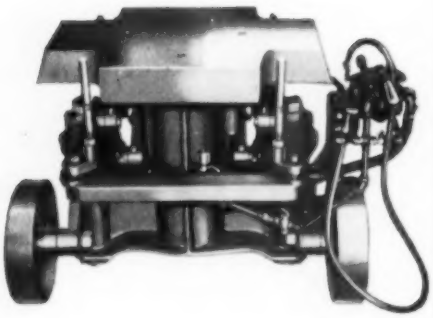
**Jolt Squeezer—Arm type**
**5 sizes**



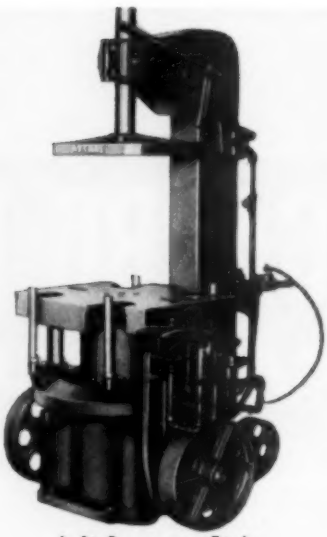
**Jolt Rollover Squeeze Draw**
**4 sizes**



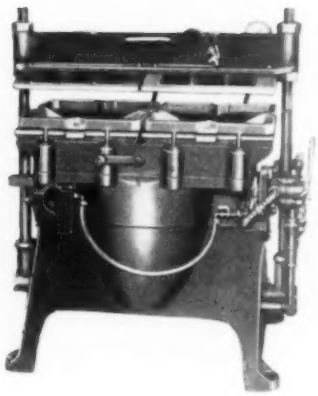
**Jolt Squeezer—Strain rod type**
**2 sizes**



**Jolt Pin Lift**
**3 sizes**



**Jolt Squeeze Strip**
**4 sizes**



**Multiple Molding**
**3 sizes**

**Jolt Rollover Draw**
**3 sizes**

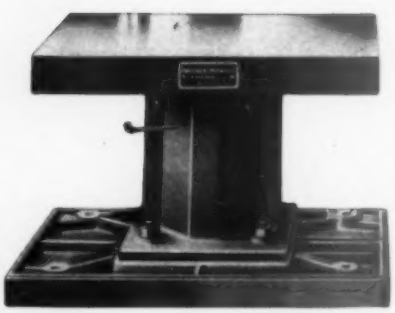
## *8 Good Ways to*
## CUT MOLDING COSTS

Here's a molding crew that knows its business—these eight veteran shock troopers proved in the incessant war against lagging production and climbing costs.

You can expect "good news for foundries" regularly from Arcade. Meanwhile send for bulletins.

# ARCADE

**MANUFACTURING DIVISION**
**ROCKWELL MANUFACTURING CO.**
**FREEPORT, ILLINOIS**



**Plain Jolt**
**6 sizes**

# Foundry Studies Need Broader Application

TRANSFORMING results of research into production routine often proves more troublesome than the actual research. Time, money and effort may be expended in the study and development of an idea, and the resultant conclusions may have potentials for producing a better product, making this product at a lower cost, or eliminating difficult production problems. But all too often the research report does not reach those directly concerned with the particular industrial problem under consideration. Instead, these valuable documents frequently find a final resting place in the files or book shelves of the boss, and are forgotten.

Much investigational work in the foundry industry is accomplished through technical committees of various societies and associations. Studies on a wide range of projects are undertaken by the best technical talent available, and the summation of individual contributions provides information of tremendous value to producers of castings. But the effort is practically useless unless the results are applied to practice. The need for a greater appreciation of the value of this material was expressed recently by the president of one foundry society who pointed to the importance of all companies in the group utilizing this type of information as a tool for increasing profits. A study by the group revealed the interesting fact that while some firms may have been slow to apply these developments, various committee members, realizing the value of the information developed through their collective efforts, have been using the reports with startling results in dollar savings and improvement of product.

Because the American Foundrymen's Society operates its foundry studies through committees, and since many of these committees will present reports at the coming St. Louis convention, an exceptional opportunity is offered the foundry industry to learn first hand of the work being done by that organization. At the same time, the members of the industry are permitted to contribute to the discussion of the reports, which always increases the overall value of these developments.

The AFS is offering an excellent program of technical papers and reports which should develop material of interest and profit to every man engaged in the practical, technical or management phases of castings production. To add to the value of the annual meeting, the St. Louis District Chapter has arranged for a number of foundries to be available for plant visitation.

Faced with the pressing problem of selling quality castings at a profit, it would seem that the men of the foundry industry cannot afford to miss the discussions which will take place in St. Louis, May 2 to 5. Let's make greater use of the technical knowledge which constantly is being developed.

We'll see you in St. Louis.

Frank G. Steinebach
Editor

THE FOUNDRY
WHEREVER METALS ARE CAST

# St. Louis Host to AFS

FOR the second time—and under happier circumstances—St. Louis District Chapter will be host to the national convention of the American Foundrymen's Society when the 53rd annual meeting is held there Monday through Thursday, May 2-5. The other congress in St. Louis was the wartime gathering of 1943, with its emphasis on means for increasing the supply of castings for military purposes. The approximately 70 technical papers and reports included in the comprehensive 1949 program will stress latest developments not only in castings applications, but also in methods for improving efficiency of production and quality of product. The detailed program appears in this issue, starting on page 88.

Most of the convention sessions will be held at Hotel Jefferson, the remainder being scheduled for Hotel Statler and the DeSoto Hotel. Registration headquarters will be maintained on the Jefferson's mezzanine floor, and for the benefit of early arrivals the registration desk will be open Sunday afternoon, May 1. Registration fees for the week are $5 for AFS members and $7.50 for guests. Special facilities will be available again this year, at the Jefferson, for additional registration of Canadian members, international visitors and "old timers."

**Technical Program**—The convention's four days of technical discussions will concentrate sessions devoted to Malleable Iron, Brass and Bronze, and Aluminum and Magnesium on Monday and Tuesday; Gray Iron and Steel on Wednesday and Thursday, Sand and Patternmaking on Tuesday and Wednesday. The Educational Division's dinner meeting is scheduled for Monday, and the Heat Transfer, Foundry Cost, Refractories, Time Study and Methods, and Plant and Plant Equipment sessions will be held Tuesday. A session on Safety and Hygiene will be on Thursday.

Two shop courses, one on Sand and the other on Gray Iron, will be held Monday, Tuesday and Wednesday evenings. Subjects for the Sand Shop Course include causes of penetration in steel castings, use of resin bonded sand cores, and core blowing. The Gray Iron Shop Course will discuss carbon trends in gray iron, inexpensive tests for small gray iron foundries, and sources of metal losses.

Among features of the ferrous divisions' programs are two joint sessions. The Gray Iron and Malleable groups will join Tuesday at 4 p.m. for a symposium on "Production of Nodular Graphite Gray Iron," with discussions by four well known metallurgists. Wednesday evening the Gray Iron and Steel joint session will present a colored motion picture depicting recent investigations of mold gating at Naval Research Laboratory, Washington. Earlier studies of this subject were reported on at the 1948 convention.

Progress reports on research projects being sponsored by a number of divisions and committees will be presented at various technical sessions. These will include the following: Aluminum and Magnesium Division's two studies, one on hydraulics of light metal flow into molds, the other on centrifugal casting of light metal alloys; Brass and Bronze Division's investigation of fracture test as an index of melt quality; Malleable Division's work on selective hardening of pearlitic malleable iron, and the Heat Transfer Committee's study of fundamentals of heat flow during casting solidification. A progress report also will be presented by the Cupola Research Committee.

Exchange papers relating to cast iron are to be given by two foreign foundry associations. The Institute of British Foundrymen is sponsoring a paper on "Properties of Cast Iron in Relation to the Carbon

# Convention

Aerial view of downtown St. Louis, site of the AFS 53rd Annual Convention

Equivalent Value," while a paper from the Institute of Australian Foundrymen is entitled "Graphitization of Gray Cast Iron by Heat Treatment."

**Plant Visitations**—A number of St. Louis district foundries will be open for inspection by convention visitors. Arrangements for these visits, to both ferrous and nonferrous shops, have been made by one of the special committees appointed by St. Louis District Chapter to handle various convention details. Information concerning the plants and hours for inspection are presented on page 140 of this issue. Inquiries regarding plant visits also may be made at special headquarters to be established at Hotel Jefferson.

**Business Meeting**—AFS President William B. Wallis will preside at the annual business meeting to be held Wednesday at 2 p.m. In addition to the president's annual address, this meeting will include the election of officers and directors and the awarding of prizes in the national apprentice contest. Immediately following the business meeting will be the Charles Edgar Hoyt Annual Lecture, to be presented by John Howe Hall, consultant, Swarthmore, Pa., on "Steel Castings in Welded Assemblies."

**Divisional Meetings**—Business meetings of the various AFS divisions will be held during the first three days of the convention. The schedule follows: Monday—4 p.m. Educationl Division, 8 p.m. Brass and Bronze Division; Tuesday—3 p.m. Malleable Division, 8 p.m. Pattern Division, Aluminum and Magnesium Division and Gray Iron Division. Wednesday—4 p.m. Steel Division and Sand Division.

**Ladies Entertainment**—For the entertainment of ladies who will be in St. Louis for the convention a varied program has been arranged by a local committee of which Mrs. A. L. Hunt is chairman, Mrs. E. J. AuBuchon co-chairman and Mrs. Walter A. Zeiss secretary-treasurer. (*Please turn to page* 172)

# Convention Program

## MONDAY, MAY 2

**8:30 a.m.—Registration—Hotel Jefferson**

**10 a.m. (A)—Aluminum and Magnesium Session**
Presiding—A. W. Stolzenburg, Aluminum Co. of America, Detroit. Co-chairman—T. E. Kramer, Acme Aluminum Alloys Inc., Dayton.

*Metallography of Aluminum Casting Alloys*—A. M. Montgomery, Aluminum Co. of America, Cleveland.

*Metallography of Cast Magnesium Alloys*—P. F. George, the Dow Chemical Co., Midland, Mich.

**10 a.m. (B)—Brass and Bronze Session**
Presiding—E. W. Horlebein, Gibson & Kirk Co., Baltimore. Co-chairman—R. W. Parsons, Ohio Brass Co., Mansfield, O.

*Casting Finish*—H. H. Fairfield and J. MacConachie, Wm. Kennedy & Sons Ltd., Owen Sound, Ontario.

*Effects of Melting Atmosphere, Time at Temperature and Degasification on Properties of Valve Bronze*—W. H. Baer and B. M. Loring, Naval Research Laboratory, Washington.

*Practical Melting and Its Relation to Gases in Metal*—O. E. Decker, Acheson Mfg. Co., Pittsburgh.

**10 a.m. (C)—Malleable Session**
Presiding—J. A. Durr, Albion Malleable Iron Co., Albion, Mich. Co-chairman—H. L. Day, Auto Specialties Mfg. Co., St. Joseph, Mich.

*Effects of Temperature and Silicon Content on First Stage Annealing of Blackheart Malleable Iron*—J. E. Rehder, Canadian Bureau of Mines, Ottawa.

*Surface Hardening of Pearlitic Malleable Iron*—Progress Report, Malleable Research Project—S. H. Bush, W. P. Wood and F. B. Rote, University of Michigan, Ann Arbor, Mich.

**12 noon—Aluminum and Magnesium Roundtable Luncheon**
Presiding—R. F. Thomson, International Nickel Co., Detroit. Co-chairman—W. E. Sicha, Aluminum Co. of America, Cleveland.

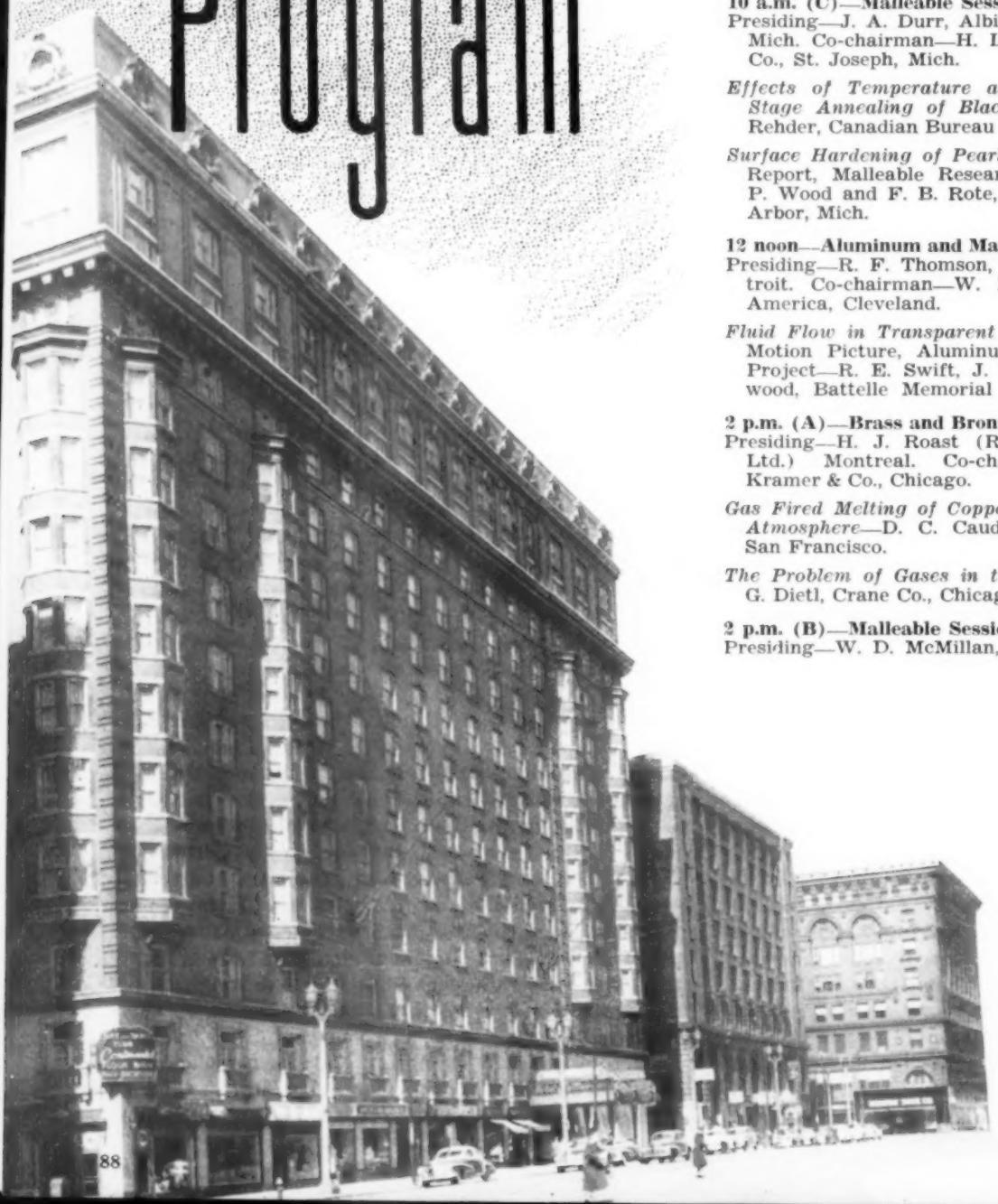
*Fluid Flow in Transparent Molds*—Progress Report and Motion Picture, Aluminum and Magnesium Research Project—R. E. Swift, J. H. Jackson and L. W. Eastwood, Battelle Memorial Institute, Columbus, O.

**2 p.m. (A)—Brass and Bronze Session**
Presiding—H. J. Roast (Retired—Canadian Bronze Co. Ltd.) Montreal. Co-chairman—W. Romanoff, H. Kramer & Co., Chicago.

*Gas Fired Melting of Copper Base Alloys in a Reducing Atmosphere*—D. C. Caudron, Pacific Brass Foundry, San Francisco.

*The Problem of Gases in the Indirect Arc Furnace*—M. G. Dietl, Crane Co., Chicago.

**2 p.m. (B)—Malleable Session**
Presiding—W. D. McMillan, International Harvester Co.,



Hotel Jefferson, registration headquarters for the St. Louis convention

Chicago. Co-chairman—R. P. Schauss, Illinois Clay Products Co., Chicago.

*Influence of Type of Slag on Heat Treatment Susceptibility of Malleable Iron*—G. A. Vennerholm and H. N. Bogart, Ford Motor Co., Dearborn, Mich.

*Influence of Heating Rate on First Stage Graphitization of White Cast Iron*—R. Schneidewind, University of Michigan, Ann Arbor, Mich., and D. J Reese, International Nickel Co., New York.

**4 p.m. (A)—Malleable Session**
Presiding—C. F. Joseph, Central Foundry Division, General Motors Corp., Saginaw, Mich. Co-chairman—C. F. Lauenstein, Link-Belt Co., Indianapolis.

*Some Effects of Deoxidation Treatments on Graphitization of White Cast Iron*—R. W. Heine, University of Wisconsin, Madison, Wis.

*Influence of Silicon Content on Critical Temperature Range During Slow Cooling of Blackheart Malleable Iron*—J. E. Rehder, Canadian Bureau of Mines, Ottawa.

**4 p.m. (B)—Brass and Bronze Session**
Presiding—H. M. St. John, Crane Co., Chicago. Co-chairman—B. M. Loring, Naval Research Laboratory, Washington.

*Graphite Resistor Furnace Melting Practice*—B. N. Ames and N. A. Kahn, New York Naval Shipyard, Brooklyn, N. Y.

*Melt Quality and Fracture Characteristics of 85-5-5-5 Red Brass*—Brass and Bronze Research Progress Report—J. P. Ewing, C. Upthegrove, and F. B. Rote, University of Michigan, Ann Arbor, Mich.

**5 p.m.—Registration Closes**

**6 p.m.—Educational Dinner**
Presiding—F. G. Sefing, International Nickel Co., New York. Co-chairman—A. W. Gregg, Whiting Corp., Harvey, Ill.

*How to Interest Our Youth in The Foundry Industry*—Discussion by E. E. Greene, Indianapolis Public Schools, Indianapolis, representing schools, and F. B. Skeates, Link-Belt Co., Chicago, representing industry.

**8 p.m. (A)—Gray Iron Shop Course**
Presiding—K. H. Priestley, Vassar Electroloy Products Inc., Vassar, Mich. Co-chairman—N. L. Peukert, Carondelet Foundry Co., St. Louis.

*Carbon Trends in Gray Iron.* Discussion Leader— W. W. Levi, Lynchburg Foundry Co., Radford, Va.

**8 p.m. (B)—Sand Shop Course**
Presiding—R. H. Jacoby, the Key Co., East St. Louis, Ill. Co-chairman—L. A. Kleber, General Steel Castings Co., Granite City, Ill.

Subject—*Causes of Penetration in Steel Castings.* Discussion Leader—E. E. Woodliff, Foundry Sand Service Engineering Co., Detroit.

## TUESDAY, MAY 3

**9 a.m.—Registration Opens**

**10 a.m. (A)—Heat Transfer Session**
Presiding—E. C. Troy, Palmyra, N. J. Co-chairman—J. B. Caine, Sawbrook Steel Castings Co., Lockland, Cincinnati.

*Comparative Solidification Studies*—Progress Report, Heat Transfer Research, V. Paschkis, Columbia University, New York.

*The Foundryman and Heat Transfer*—V. Paschkis, Columbia University, New York.

**10 a.m. (B)—Malleable Session**
Presiding—Milton Tilley, National Malleable & Steel Castings Co., Cleveland. Co-chairman—Eric Welander, Union Malleable Iron Works, Deere & Co., East Moline, Ill.

*Controlled Atmosphere Annealing of Malleable Iron*—Committee Report, R. P. Schauss, Illinois Clay Products Co., Chicago.

*Maintenance in a Mechanized Foundry*—C. T. Luther, Central Foundry Division, General Motors Corp., Saginaw, Mich.

**10 a.m. (C)—Aluminum and Magnesium Session**
Presiding—C. E. Nelson, the Dow Chemical Co., Midland, Mich. Co-chairman—W. T. Bean Jr., consultant, Detroit.

*Designing Magnesium Castings for Aircraft Engines*—M. H. Young and A. G. Slachta, Wright Aeronautical Corp., Wood Ridge, N. J.

*Design of Light Metal Castings*—G. H. Found, the Dow Chemical Co., Midland, Mich.

**10 a.m. (D)—Brass and Bronze Session**
Presiding—A. K. Higgins, Allis-Chalmers Mfg. Co., Milwaukee. Co-chairman—H. F. Taylor, Massachusetts Institute of Technology, Cambridge, Mass.

*Effect of Composition on Properties and Structure of Cast Monel*—J. T. Eash and T. E. Kihlgren, International Nickel Co., Bayonne, N. J.

*Recent Developments in Theory and Practice of Insulating Sleeves, Pads, and Risers for Nonferrous Casting*—K. A. Miericke, U. S. Gypsum Co., Chicago.

**12 noon (A)—Brass and Bronze Roundtable Luncheon**
Presiding—B. A. Miller, the Baldwin Locomotive Works, Philadelphia. Co-chairman—H. L. Smith, Federated Metals Division, American Smelting & Refining Co., Pittsburgh.

Subject—*Some Practical Applications of the Fundamental Principles of Melting, Pouring and Casting of Tin Bronzes.*

Discussion Leaders—Melting: H. M. St. John, Crane Co., Chicago. Pouring: L. W. Eastwood, Battelle Memorial Institute, Columbus, O. Gates & Risers: G. Bradshaw, Philadelphia Naval Shipyard, Philadelphia.

**12 noon (B)—Malleable Roundtable Luncheon**
Presiding—J. H. Lansing, Malleable Founders' Society, Cleveland. Co-chairman—A. M. Fulton, Northern Malleable Iron Co., St. Paul.

Subject—*Reduction of Losses Due to Cracks or Tears.*
Discussion Leaders—R. J. Anderson, Belle City Malleable Iron Co., Racine, Wis., K. H. Hamblin, the Grinnell Co., Providence, R. I.

Subject—*Improved Malleable Melting Refractories.*
Discussion Leaders—M. J. Henley, Texas Foundries Inc., Lufkin, Tex., F. Czapski, Chicago Malleable Castings Co., Chicago.

**2 p.m. (A)—Sand Session**
Presiding—C. B. Jenni, General Steel Castings Corp., Eddystone, Pa. Co-chairman—T. W. Curry, Lynchburg Foundry Co., Lynchburg, Va.

*Plastic Binders for Foundry Sand Practice*—H. K. Salzberg, the Borden Co. Chemical Division, Bainbridge, N. Y.

*Elevated Temperature Properties of Steel Molding Sands*—Progress Report, Research Project—P. E. Kyle, Cornell University, Ithaca, N. Y.

*Causes of Rat-Tail Defects*—Committee Report, H. W. Dietert, Harry W. Dietert Co., Detroit.

**2 p.m. (B)—Aluminum and Magnesium Session**
Presiding—R. A. Quadt, Federated Metals Division, American Smelting & Refining Co., Perth Amboy, N. J. Co-chairman—A. J. Juroff, Bendix Products Division, Bendix Aviation Corp., South Bend, Ind.

*Correlation of Cooling Curve Data with Casting Characteristics of Aluminum Alloys*—E. E. Stonebrook and W. E. Sicha, Aluminum Co. of America, Cleveland.

*Fluxing of Aluminum Alloys*—Committee Report, Hiram Brown, Solar Aircraft Co., Des Moines, Iowa.

*Grain Refining of Aluminum Alloys and Its Effect on Physical Properties*—Walter Bonsack and O. Tichy, Apex Smelting Co., Cleveland.

**2 p.m. (C)—Pattern Session**

Presiding—A. F. Pfeiffer, Allis-Chalmers Mfg. Co., Milwaukee. Co-chairman—H. K. Swanson, Swanson Pattern & Model Works, East Chicago, Ind.

*Information Needed To Produce Satisfactory Pattern Equipment*—R. G. Christensen, Racine Pattern Works, Racine, Wis.

*Maintenance of Wood and Metal Patterns*—A. Huebner, Allis-Chalmers Mfg. Co., Milwaukee.

**4 p.m. (A)—Foundry Cost Session**

Presiding—R. L. Lee, Grede Foundries Inc., Milwaukee. Co-chairman—George Tisdale, Zenith Foundry Co., Milwaukee.

*Approach to Standard Costs in the Foundry*—F. Ruffalo, Westover Engineers, Milwaukee.

Question and Answer period—Cost Problems of General Interest, Method of Cost Accounting, Distribution of Costs, etc.

**4 p.m. (B)—Refractories Session**

Presiding—R. H. Zoller, Zoller Castings Co., Bettsville, O. Co-chairman—R. P. Schauss, Illinois Clay Products Co., Chicago.

Panel Discussion—Your Refractory Problems—What Are They?

**4 p.m. (C)—Joint Session, Gray Iron and Malleable**

Presiding—H. Bornstein, Deere & Co., Moline, Ill. Co-chairman—C. O. Burgess, Gray Iron Founders' Society, Cleveland.

Symposium—Production of Nodular Graphite Gray Iron.

*Spheroidal Carbon Cast Iron*—D. J. Reese, International Nickel Co., New York.

Discussion by—G. A. Vennerholm, Ford Motor Co., Dearborn, Mich., R. G. McElwee, Vanadium Corp. of America, Detroit, C. K. Donoho, American Cast Iron Pipe Co., Birmingham.

**4 p.m. (D)—Time Study and Methods Session**

Presiding—E. G. Tetzlaff, Pelton Steel Casting Co., Milwaukee. Co-chairman—M. E. Annich, American Brake Shoe Co., Mahwah, N. J.

*Developing Standard Data Tables for a Four-Man Molding Unit*—M. T. Sell, Sterling Foundry Co., Wellington, O.

**5:30 p.m.—Registration Closes**

**7 p.m.—Canadian Dinner**

**8 p.m. (A)—Plant and Plant Equipment Session**

Presiding—James Thomson, Continental Foundry & Machine Co., East Chicago, Ind. Co-chairman—E. W. Beach, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.

*Modern Foundry Core and Mold Ovens*—C. A. Barnett, Foundry Equipment Co., Cleveland.

**8 p.m. (B)—Gray Iron Shop Course**

Presiding—H. H. Wilder, Eaton Mfg. Co., Vassar, Mich. Co-chairman—M. Reichert, Ranner Iron Works, St. Louis.

Subject—*Inexpensive Tests for Small Gray Iron Foundries.*

Discussion Leader—W. Bohm, Buick Motor Division, General Motors Corp., Flint, Mich.

**8 p.m. (C)—Sand Shop Course**

Presiding—E. L. Thomas, Cadillac Motor Car Division, General Motors Corp., Detroit. Co-chairman—D. F. Sawtelle, Malleable Iron Fittings Co., Branford, Conn.

Subject—*Resin Sand Cores vs. Oil Sand Cores.*

Discussion Leader—T. W. Curry, Lynchburg Foundry Co., Lynchburg, Va.

## WEDNESDAY, MAY 4

**9 a.m.—Registration Opens**

**10 a.m. (A)—Gray Iron Session**

Presiding—R. G. McElwee, Vanadium Corp. of America, Detroit. Co-chairman—A. E. Schuh, U. S. Pipe & Foundry Co., Burlington, N. J.

*Effect of Boron on Structure and Some Properties of Plain Cast Irons*—A. I. Krynitsky and H. Stern, National Bureau of Standards, Washington.

*Blast Humidity as a Factor in Cupola Operations*—D. E. Krause, Gray Iron Research Institute Inc., and H. W. Lownie, Jr., Battelle Memorial Institute, Columbus, O.

**10 a.m. (B)—Sand Session**

Presiding—G. J. Barker, University of Wisconsin, Madison, Wis. Co-chairman—H. K. Salzberg, the Borden Co., Bainbridge, N. Y.

*pH of Foundry Sands*—B. H. Booth, Carpenter Bros. Inc., Milwaukee.

*Causes of Scab Defect*—Committee Progress Report—G. F. Watson, American Brake Shoe Co., Mahwah, N. J.

**10 a.m. (C)—Steel Session**

Presiding—Charles Locke, Armour Research Foundation, Chicago. Co-chairman—C. H. Lorig, Battelle Memorial Institute, Columbus, O.

*A New Method for Determining Austenitic Grain Size of Cast Steel*—E. J. Eckel, University of Illinois, Urbana, Ill., and S. J. Paprocki, Battelle Memorial Institute, Columbus, O.

*Note on As-Cast Structure and Grain Size in Cast Alloy Steels*—E. A. Loria, Mellon Institute of Industrial Research, Pittsburgh.

*Prevention of Hot Tears in Thick-Walled Centrifugally Cast Steel Tubes*—J. F. Wallace and J. L. Martin, Watertown Arsenal, Watertown, Mass.

**12 noon (A)—Pattern Roundtable Luncheon**

Presiding—L. F. Tucker, City Pattern & Foundry Co. Inc., South Bend, Ind. Co-chairman—H. K. Swanson, Swanson Pattern & Model Works, E. Chicago, Ind.

*Shall Pattern Equipment be Machined or Cast to Size*—Vaughan C. Reid, City Pattern Foundry & Machine Co., Detroit.

**12 noon (B)—Engineering School Graduates Luncheon**

Presiding—C. J. Freund, University of Detroit, Detroit.

**2 p.m.—Annual Business Meeting**

Presiding—W. B. Wallis, president, American Foundrymen's Society.

President's Annual Address.
Apprentice Contest Awards.
Election of Officers and Directors.

**2:45 p.m.—Charles Edgar Hoyt Annual Lecture**

*Steel Castings in Welded Assemblies*—John Howe Hall, consultant, Swarthmore, Pa.

**4 p.m.—Gray Iron Session**

Presiding—T. E. Eagan, Cooper-Bessemer Corp., Grove City, Pa. Co-chairman—R. Schneidewind, University of Michigan, Ann Arbor, Mich.

*Graphitizing Behavior of White Cast Iron*—S. C. Massari, American Foundrymen's Society, Chicago.

Progress Report, Cupola Research—R. G. McElwee, Vanadium Corp. of America, Detroit.

*The Properties of Cast Iron in Relation to the Carbon Equivalent Value*—Exchange Paper—Institute of British Foundrymen—Dr. H. T. Angus, F. Dunn and D. Marles, British Cast Iron Research Association, Birmingham, England. To be presented by Dr. Schneidewind.

**5:30 p.m.—Registration Closes**

**7 p.m.—AFS Alumni Dinner**

Missouri Athletic Club (by invitation only)

**8 p.m. (A)—Gray Iron Shop Course**

Presiding—E. J. Burke, Hanna Furnace Corp., Buffalo. Co-chairman—R. M. Hill, East St. Louis Castings Co., East St. Louis, Ill.

Subject—*Sources of Metal Losses in the Foundry.*
Panel Discussion—A. Barczak, Superior Foundry Inc., Cleveland. N. L. Peukert, Carondelet Foundry Co., St. Louis.

**8 p.m. (B)—Sand Shop Course**

Presiding—F. S. Brewster, Harry W. Dietert Co., Detroit. Co-chairman—E. J. Bush, Naval Gun Factory, Washington.

Subject—*Core Sand Blowing Practices.*
Discussion Leader—H. Schutzenhoffer, the Key Co., East St. Louis, Ill.

**8 p.m. (C)—Joint Session, Gray Iron and Steel**

Presiding—H. F. Taylor, Massachusetts Institute of Technology, Cambridge, Mass. Co-chairman—T. W. Curry, Lynchburg Foundry Co., Lynchburg, Va.

Colored Motion Picture—*Finger Gating and Step Gating*—W. H. Johnson and W. O. Baker, Naval Research Laboratory, Washington.

## THURSDAY, MAY 5

**9 a.m.—Registration Opens**

**10 a.m. (A)—Gray Iron Session**

Presiding—J. S. Vanick, International Nickel Co., New York. Co-chairman—G. P. Phillips, International Harvester Co., Chicago.

*High Silicon Cast Iron Resists Growth and Scaling*—W. H. White, Jackson Iron & Steel Co., Jackson, O., and A. R. Elsea, Battelle Memorial Institute, Columbus, O.

*Graphitization of Gray Cast Iron by Heat Treatment*—Institute of Australian Foundrymen Exchange Paper—A. W. Silvester, Russell Mfg. Co., Pty. Ltd., Melbourne, Australia.

**10 a.m. (B)—Steel Session**

Presiding—Edward Berry, Dodge Steel Co., Philadelphia. Co-chairman—Clyde Wyman, Burnside Steel Foundry Co., Chicago.

*Rapid Analysis of Acid Slags*—E. C. Zuppann, Wilson Foundry & Machine Co., Pontiac, Mich., and A. E. Martin, University of Minnesota, Minneapolis.

*A Study of Insulating and Mildly Exothermic Antipiping Compounds Used for Steel Castings*—S. L. Gertsman, Canadian Bureau of Mines, Ottawa.

**10 a.m. (C)—Safety and Hygiene Session**

Presiding—L. C. Wilson, Reading, Pa. Co-chairman—J. R. Allan, International Harvester Co., Chicago.

*Attracting and Keeping Good Men in the Foundry*—G. E. Tubich, Michigan Department of Health, Grand Rapids, Mich.

*Industrial Hygiene in the Foundry*—H. J. Weber, American Brake Shoe Co., Chicago.

**12 noon (A)—Gray Iron Roundtable Luncheon**

Presiding—V. A. Crosby, Climax-Molybdenum Co., Detroit. Co-chairman—C. O. Burgess, Gray Iron Founders' Society, Cleveland.

Subject—*Gating and Risering.*
Discussion Leaders—H. F. Taylor, Massachusetts Institute of Technology, Cambridge, Mass., N. A. Birch, American Brake Shoe Co., Mahwah, N. J.

**12 noon (B)—Steel Roundtable Luncheon**

Presiding—R. H. Frank, Bonney-Floyd Co., Columbus, O. Co-chairmen—V. E. Zang, Unitcast Corp., Toledo, O., F. O. Lemmon, Ohio Steel Foundry Co., Springfield, O.

Subject—*Sand Testing and Its Relation to Casting Defects.*

**4 p.m. (A)—Steel Session**

Presiding—R. E. Kerr, Pettibone Mulliken Corp., Chicago. Co-chairman—G. W. Johnson, Vanadium Corp. of America, Chicago.

*Effect of Various Deoxidizers on the Structure of Sulphide Inclusions*—C. E. Sims, H. A. Saller, and F. W. Boulger, Battelle Memorial Institute, Columbus, O.

*Effect of Aluminum and Vanadium on the Toughness of High Hardenability Cast Steel*—J. F. Wallace, Watertown Arsenal, Watertown, Mass.

**4 p.m. (B)—Gray Iron Session**

Presiding—W. A. Pennington, Carrier Corp., Syracuse, N. Y. Co-chairman—W. W. Levi, Lynchburg Foundry Co., Radford, Va.

*Production and Consumption of Heat in the Cupola*—D. W. Gunther, National Radiator Co., Johnstown, Pa.

*Design and Operation of a 10-Inch Cupola*—D. E. Krause, Gray Iron Research Institute Inc., and H. W. Lownie Jr., Battelle Memorial Institute, Columbus, O.

**4:30 p.m.—Registration Closes**

**7 p.m.—Annual Banquet**

Presiding—W. B. Wallis, president, American Foundrymen's Society.

Presentation of AFS Gold Medal Awards and Honorary Life Memberships.

Speaker—Hon. W. Stuart Symington, Secretary Air Force, Washington.

# ST. LOUIS DISTRICT CHAPTER

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Historic old St. Louis Courthouse. It was completed in 1862

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# Seven foundrymen to receive AFS Awards

SEVEN foundrymen long prominent in the industry will be honored May 5 at the annual banquet of the American Foundrymen's Society, concluding feature of the organization's annual convention in St. Louis. Three have been chosen by the Board of Awards to receive gold medals and four will receive honorary life memberships in the society in recognition of their contributions to the castings industry.

Russell J. Anderson, works manager of the Belle City Malleable Iron Co., Racine, Wis., has been named to receive the Peter L. Simpson Gold Medal in recognition of his "outstanding service to the society and in the public interest as chairman of the Wisconsin Chapter of the AFS and of the Wisconsin Centennial Foundry Committee."

The John H. Whiting Gold Medal will be awarded to S. C. Massari, technical director of the American Foundrymen's Society, for "outstanding contributions in the field of ferrous metallurgy, molding and foundry practice and service to the wartime foundry industry with the Chicago Ordnance District."

Third medalist is Gosta Vennerholm, assistant head of chemical and metallurgical research, Ford Motor Co., Dearborn, Mich., who has been designated to receive the William H. McFadden Gold Medal "for outstanding contributions to the castings industry in the fields of both ferrous and nonferrous metallurgy and practice."

In addition to the medal awards, the following will be conferred honorary life memberships: Clement J. Freund, dean of the College of Engineering, University of Detroit, Detroit; Anthony Haswell, president, Dayton Malleable Iron Co., Dayton, O.; Ralph L Lee, secretary-treasurer, Grede Foundries Inc., Milwaukee; William B. Wallis, president, Pittsburgh Lectromelt Furnace Corp., Pittsburgh, and retiring president of the society.

**Russell J. Anderson** has been with the Belle City Malleable Iron Co. since 1920, and during the past 29 years has served in most of the company's departments. Trained originally as a toolmaker during an apprenticeship from 1913 to 1917, Mr. Anderson has supplemented his education with mechanical engineer-

## Honorary Life Members

ANTHONY HASWELL

RALPH L. LEE

# Gold Medalists

GOSTA VENNERHOLM

RUSSELL J. ANDERSON

S. C. MASSARI

ing and drawing courses at night school and university extension classes.

**S. C. Massari,** who has served as technical director of the American Foundrymen's Society since 1946, is a graduate of the Massachusetts Institute of Technology, receiving a degree of bachelor of science in metallurgy in 1924. His industrial career began the following year when he joined the Illinois Zinc Co., Peru, Ill., as director of research. In 1926 he became associated with the Association of Manufacturers' of Chilled Car Wheels, Chicago, as chief metallurgist in charge of research, a position he held until he entered the armed forces in 1942. During his service with the Army, he was in charge of all engineering and production of tank automotive ordnance equipment in the Chicago Ordnance District and was awarded the Army Legion of Merit in recognition of his service in that capacity. He was released from active duty in 1945 as a lieutenant colonel. Mr. Massari has contributed much to the technical press on metallurgical subjects and has been active in many national professional associations. At present he is serving as secretary of the Metals Engineering Division of the American Society of Mechanical Engineers.

**Gosta Vennerholm,** a native of Sweden, studied metallurgy and was graduated from the College of Technology, Stockholm, and continued his studies in Dresden, Germany. In 1924 he came to the United States and joined the Ford Motor Co., becoming a member of the laboratory staff at Highland Park, Mich. From 1933 to 1938 he supervised the reorganization of Ford foundries in England and Europe, and upon his return to this country, Mr. Vennerholm became associated with the Ford company's chemical and metallurgical department.

**Clement J. Freund,** a graduate of Campion College, also received a degree in mechanical engineering from Marquette University in 1922. He was associated with the Falk Corp., Milwaukee, for 10 years, becoming its apprentice supervisor in 1925. Since 1932 Mr. Freund has been dean of engineering at the University of Detroit, and in recognition of his many years as a leader in the apprentice training work of the AFS and "for sincere and constant service of the castings industry by encouraging young men to enter the foundry trade," has been named one of the society's honorary life members.

**Anthony Haswell,** a graduate of Princeton University, in 1942 succeeded his father as president of the Dayton Malleable Iron Co. Mr. Haswell is a past president of the Malleable Founders' Society and is being honored with life membership in the AFS in recognition of his farsighted leadership as one of the founders of the Foundry Educational Foundation. He was the foundation's first president and is now serving as its chairman.

**Ralph L. Lee,** who has been chairman of the AFS Cost Control Committee since 1935, will receive an honorary life membership in the AFS in recognition of his outstanding work in the field of cost control. In 1948 he was the author (*Please turn to page* 250)

CLEMENT J. FREUND

WILLIAM B. WALLIS

# SAFETY

# In Manual Handling of

WE IN the foundry industry are sometimes inclined to relax our efforts in promoting safety practices. We console ourselves by thinking we have a much more difficult job to perform than do other industries because of the manual handling of material that is required. Actually, our problems are little different than those encountered by other manufacturers.

Foundries of today have progressed far in the direction of cleanliness and mechanized material handling from those of ten and twenty years ago. In most production foundries a great percentage of the operations are mechanized by means of conveyors, hoists and automatic equipment to such an extent that operations in a foundry very much resemble other manufacturing operations, except for the fact that metal is being melted and poured. Therefore when we consider the manual handling operations performed in a foundry we find a striking resemblance to those performed in a machine shop. After all, what difference is there between handling nuts, bolts and gears, etc., in a machine shop and handling cores, flasks, bottom boards and castings in a foundry?

Even those operations performed mechanically require some manual operations and manual handling of material. It has been our experience that operations which are basically manual produce less accidents than those in which the manual operation is only a part of or incidental to the basic mechanical operation. This apparently results from the fact that where we have a single operation, we are more prone to analyze it thoroughly and correct the unsafe practice, whereas in the mechanical operation where the material handling by hand is only incidental, we forget that particular part in our desire to have safe practices in the mechanized operation.

I can think of past experiences, for instance, at the core blowers. Here we have a machine which blows sand under 100 lb air pressure into a corebox. We have spent considerable time and effort in providing safety devices to prevent the man from catching his hands in the machine while it is operating. Interlocking air valves which require the use of both hands at the same time insure the proper sequence of operations, which in turn also prevents sand at high pressures from being blown against him or other

*Left*—Illustrating safety equipment that must be worn in handling metal or working around cupola

By FRANK W. SHIPLEY
*Foundry Manager*
Caterpillar Tractor Co.
Peoria, Ill.

people in the same area.

Nevertheless, the man manually puts the empty corebox under the sand magazine and removes it after it is filled. This part of the operation affords an excellent opportunity for pinched fingers and broken feet if the man is not careful and wide awake, and we have had accidents from this source.

The key to this problem lies first in the correct analysis of the operation, taking into account both the mechanical and manual details and in the proper instruction and emphasis of the instruction regarding the correct methods of handling. For this reason supervision must be ever alert to secure better and safer methods; it must never assume that a new employee should know how to do the job safely, or that an old employee ought to know, because he has had previous experience.

Most of us are familiar with the proper method of working safely and how we should perform a certain task, but at the same time we are all inclined to be lazy and want to do things the easiest way without thinking. In making this statement my hope is to make the industry realize that some of the things we do wrong every day come only from a lack of thinking and not from a lack of knowledge.

The following basic principles cover almost any application of manual handling of material and cer-

# ng of Material

tainly are worthy of consideration by every supervisor when giving instructions to his men:

*Size up the load. Do not lift more than can comfortably be handled.* How many have tried to pick up a mattress? Here is a load not so heavy but at the same time very unwieldy and difficult to handle by one person; still it can be easily handled by two people. In this connection how many have had people under their supervision who were the type who wanted to show off, wanting to demonstrate how big and strong they were and how much they could lift and, instead of being reasonable, would try to pick up loads which could not be comfortably handled by one man.

*Make sure the footing is secure and get balance.* We do not build houses on poor footing, but how many times have we seen people pick up a load while standing on a loose brick, a piece of a core or an object which places one foot at a higher level than the other? When this occurs one does not have the same strength that he does on a solid footing, because all the weight is placed on one leg.

*Place feet as close as possible to object to be lifted.* This is only an example of simple mechanics, because the closer the two legs are together when one is lifting, the stronger the lifting members become, since it more nearly becomes one solid member.

*Bend knees and keep back as straight as possible. Lift with leg and arm muscles, keeping object close to the body.* These are the most important items to be considered when lifting any material. Many lost-time cases are the result of injured backs. In addition to being lost-time cases, they are also controversial because we are never able to find out exactly how a back was injured. Usually the report simply states that the man leaned over to pick up something from a table or conveyor when he noticed a pain in his back. An engineer will tell you that the farther away from a column a load is supported the greater the stress becomes on the supporting member. It only stands to reason then that using a hinged member, such as the knees, to raise and lower an object does not place the strain on the back if the object is kept as close as possible to that supporting member.

The reader is familiar with a jib crane which is supported from a column and is commonly known as a cantilever arm. An engineer knows that the farther away from the post the load is supported, the greater is the stress on the cantilever arm. The same thing happens when we try to lift an object with the back bent and the load away from the body. In the case of a jib crane the cantilever arm will support a given load to a certain length but must be increased in size to support a load farther away from the center post. In the case of a human being this cannot be done because the back's capacity is already fixed; consequently if the load is picked up nearer the column, the column and not the centilever arm carries the load.

*When necessary to change directions, do not twist the body. Lift the object to the carrying position and turn the whole body including the feet.* Here again is a case of simple engineering. When a supporting member is twisted it becomes weakened so that maximum strength is not available to do the work. For example, if a man is placing molds on a conveyor and does it in a twisted position for any length of time his back becomes weakened to the point where he can no longer do this work. If he were to pick up the mold in a straight position and then turn his whole body, he would have no difficulty with his back.

*When placing the object on a bench or table, place it on the edge and move it forward with the arm, assisting if necessary by pushing against the object with the body.* This is just a matter of the simplest and easiest way to do it, as well as the safest, but still we find people inclined to pick up an object, place it on a bench and stand as far as possible away from it while trying to push it farther onto the bench with the back in a strained position.

*When raising objects to the top of a pile, especially if over shoulder height, lift until the object is at or above waist height.* Here again we emphasize the necessity of doing the lifting with the arms and knees and keeping the back as straight as possible at all times.

*To put a load down, bend the knees and lower the load with the leg and arm muscles, keeping the back as straight as possible.* This is simply the reverse of the operations discussed concerning the picking up of any object.

The following principles of lifting and handling should also be a part of the employee's training.

*If it is a heavy job, get help. When two or more men are handling the same object, pre-determined signals should be used and warning given when one worker is about to relax his grip.* We have a number of instances in the foundry where two men are used to take an empty flask from a conveyor and place it over a pattern on a molding machine. This operation can be the source of serious accidents if the two men do not react alike. They must both move together and let loose at the same time or one of them is very likely to get a broken finger or a mashed foot.

*Throwing is hazardous. If materials must be thrown, keep feet as much out of range as possible and see to it that other workers are not in danger of being struck.* Many times it is advantageous to throw material into a tote box. A good example might be grinding operations on small parts, such as shown in the accompanying illustration. In this case the operator takes the part from a chute in front of him, grinds off the gates and risers and throws it into a tote box placed either at one side or behind him. A good precaution in this case is to place a shield at the back of the box several feet higher than the top of the box to insure against the possibility of the piece missing the container and landing on someone's foot.

Guard against injury from ends of wire and strapping, particularly when tension is released on stretched or tightly coiled wire. Also watch for broken strands in wire cable.

Inspect material for slivers, jaggers or burrs, rough or slippery condition. Use good hand leathers or gloves that afford good gripping power and protection.

Wet objects, or those coated with dirt or grease, make handling especially hazardous. They should be wiped dry or clean before handling.

Determine weight of load, use proper handling tools (bars, tongs, etc.) and mechanical handling equipment if available.

Before lifting and carrying material, check the route to be traveled for tripping hazards and underfoot conditions.

Get a firm grip, one that can be held for the full distance to be traveled, and for necessary shifting of the load.

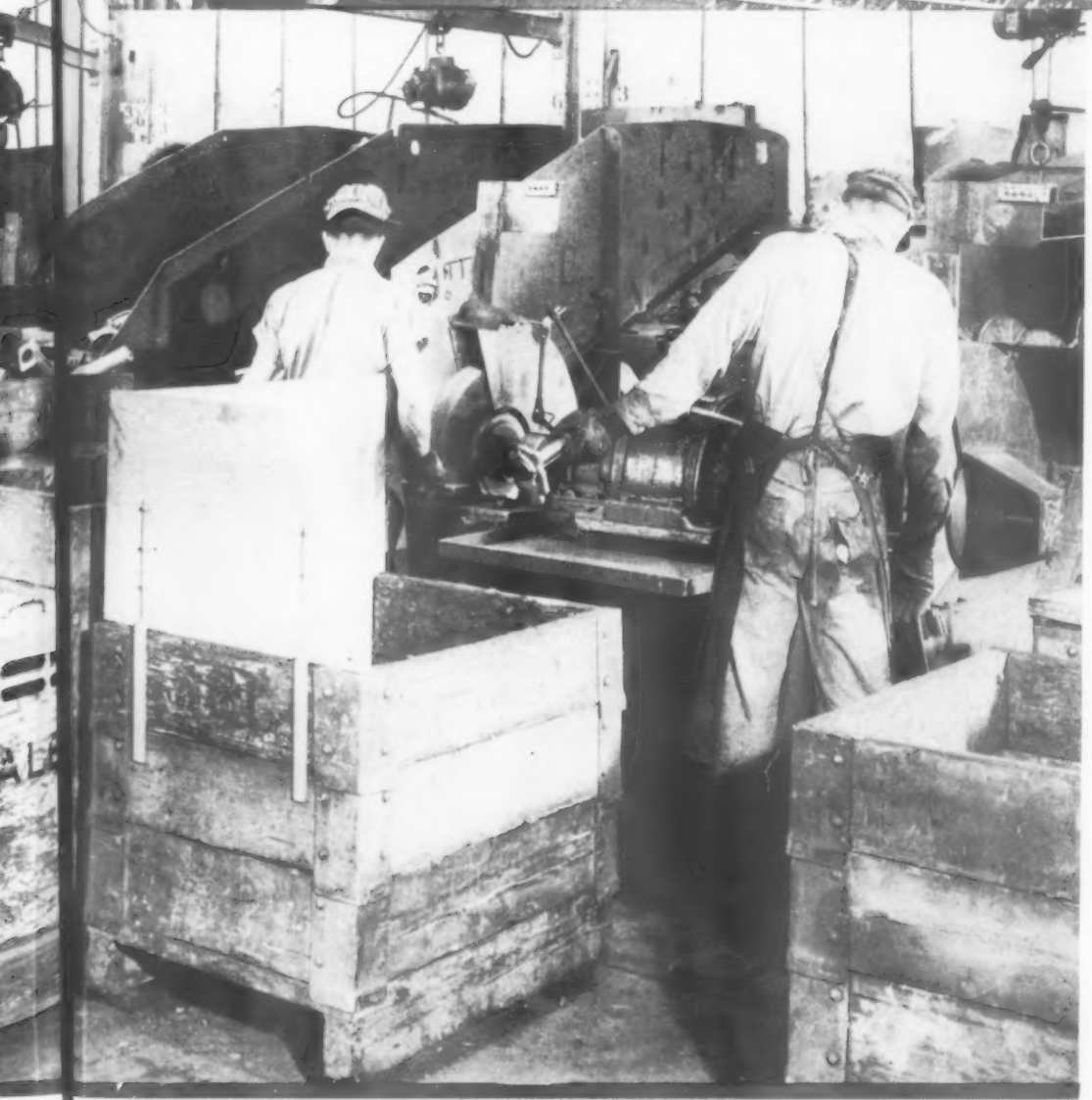
When placing the material on supports make sure the supports are properly placed and strong enough to carry the load.

When using blocks, place the object on a flat side, so that it will not tip. Where the object is to be placed on the floor, set one corner down first to avoid pinching the fingers. If the object is round, block it to prevent rolling.

Keep hands, feet and the body in the clear. Blocks help in picking up and lowering heavy objects.

Wear foot guards or safety shoes and eye protective equipment as the job may require.

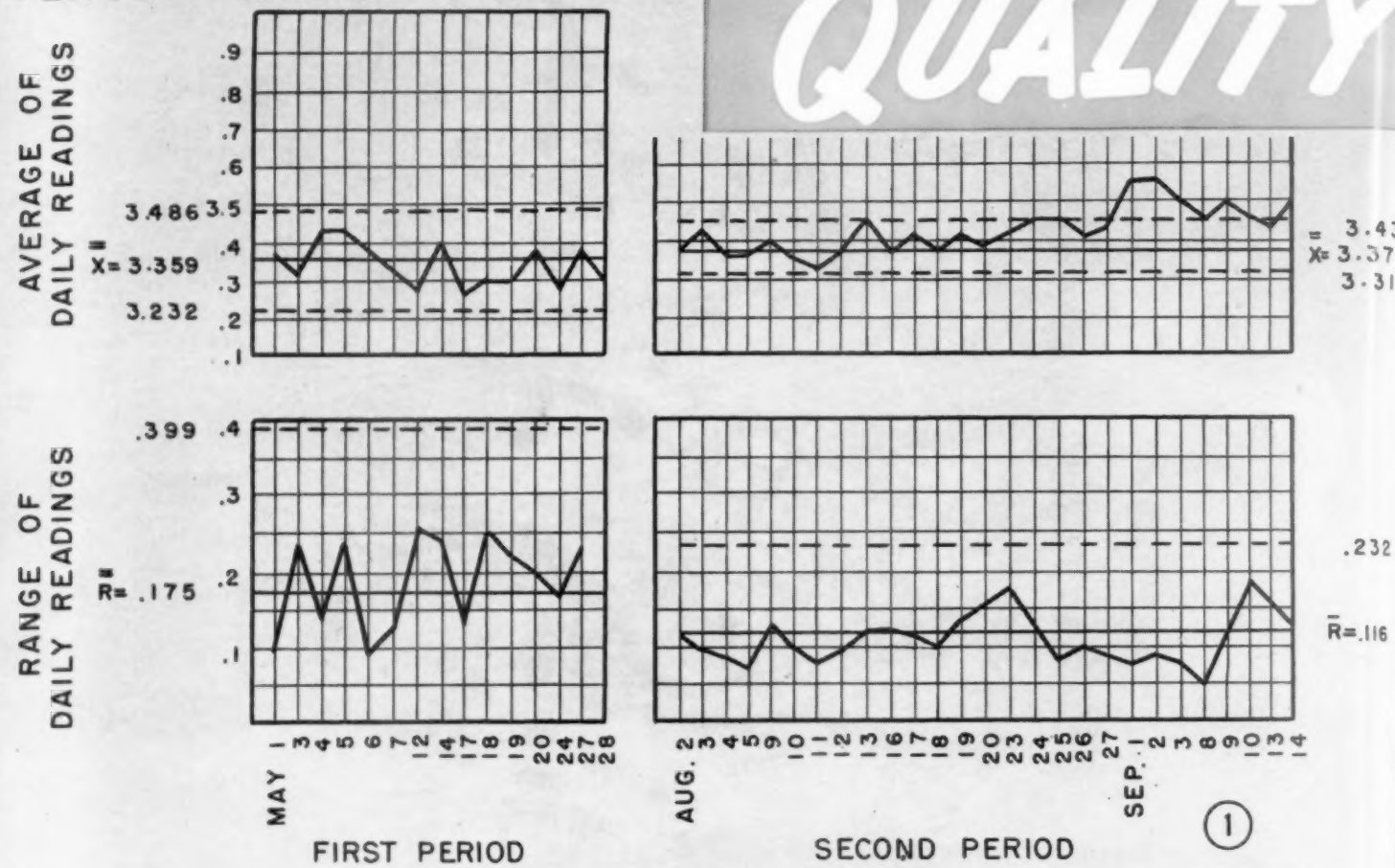
In our foundry every person in the division is required to wear eye protection which is furnished by the company. All iron pourers, cupola operators, shakeout men, sandslinger operators, penumatic chippers, grinders and shot blast operators are required to wear tight goggles and (*Please turn to page* 271)



*Above* — Mechanized coreroom showing row of blowers equipped with interlocking valves which require use of both hands in blowing cores

*Left* — Pieces ground by operator are merely tossed into tote box. A shield is provided to prevent pieces from being thrown over edge of box and possibly on someone's foot

PER CENT CARBON CONTENT

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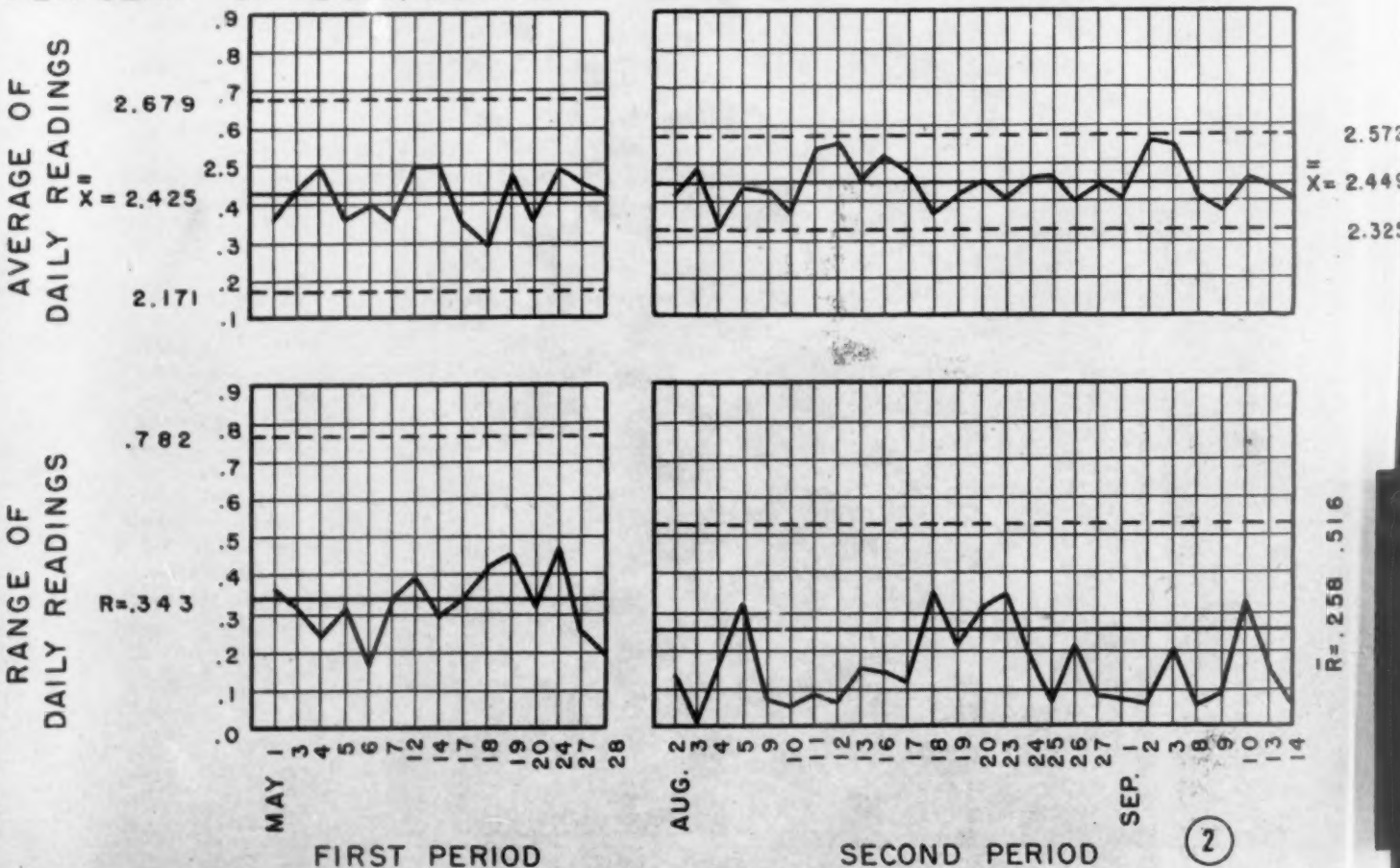

# CONTROL

# In the foundry

By ROSCOE C. BYERS and JOSEPH DICKMAN

*Staff Assistant*
Quality Control Dept.
Westinghouse Electric Corp.
East Pittsburgh, Pa.

*Metallurgist*
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Trafford, Pa.

WHEN quantitative information gathered in a foundry is treated statistically, it is possible to predict chemistry variation, dimensional variations, and machinability of castings.

A problem that continually faces the foundry is the meeting of physical requirements which are largely dependent upon the chemistry of the castings. The control of chemical composition of castings is important and is a particularly difficult problem, due to the fact that all the various metals charged into the cupola cannot be analyzed to maintain control. It would be too costly and probably not practicable.

Chemical analyses of metal in the foundry are usually made at regularly scheduled intervals. Of course, every charge from the cupola is not analyzed. In most cases, the castings have already been made, and the results of analyses cannot be used for strictly "on-the-spot" control purposes. However, chemical composition must be controlled, and a control chart technique may be used for this purpose.

Test blocks are poured at scheduled intervals daily and prepared for chemical analysis in the laboratory. A record is made of the percentage of carbon and silicon contents of the test blocks. From this information control charts are plotted. The average per cent carbon content (X) and the range (R) of the daily values are posted each day. Fig. 1 is a control chart for carbon content. The top section of the chart shows the average (X) of four daily carbon determinations, and the lower part of the chart shows the range (R) or difference between the maximum and minimum percentage of carbon found each day.

The average per cent carbon content (X) varied from 3.232 per cent to 3.486 per cent, with a possible daily range of .399 per cent for the first period shown in Fig. 1. When this information was brought to the attention of the foundry metallurgists, immediate steps were taken to reduce the amount of this variation, and the chart shows that during the second period two things happened—the average carbon content was raised and the range or variation in carbon content was reduced.

A similar analysis was made to control silicon content and is shown in Fig. 2. Again the average silicon content (X) was lower during the first period, and the variation was greater than for the second period. The properties of cast iron are governed by the amount, type, size and distribution of the various carbon formations. These factors are controlled primarily by chemical composition and relative cooling rate. The introduction of sufficient silicon promotes graphitization and thus inhibits the formation of combined or cementite carbon, which contributes to hard castings difficult to machine.

Chemical data analyzed in this manner shows the effects of changes in the foundry that are made from time to time. Such approach is an accurate and economical tool that may be applied in the chemical laboratories of foundries and make for better operating conditions and better quality of castings.

It has often been stated that one should not expect to measure castings with a micrometer. However, a micrometer was used for getting data in the foundry for the purpose of predicting how close sand castings could be cast consistently on a conveyor line production basis. The particular castings investigated were ¼-hp motor end bells. A sketch of the casting is shown in Fig. 3. Since the hub of this particular casting is used for chucking the casting during ma-

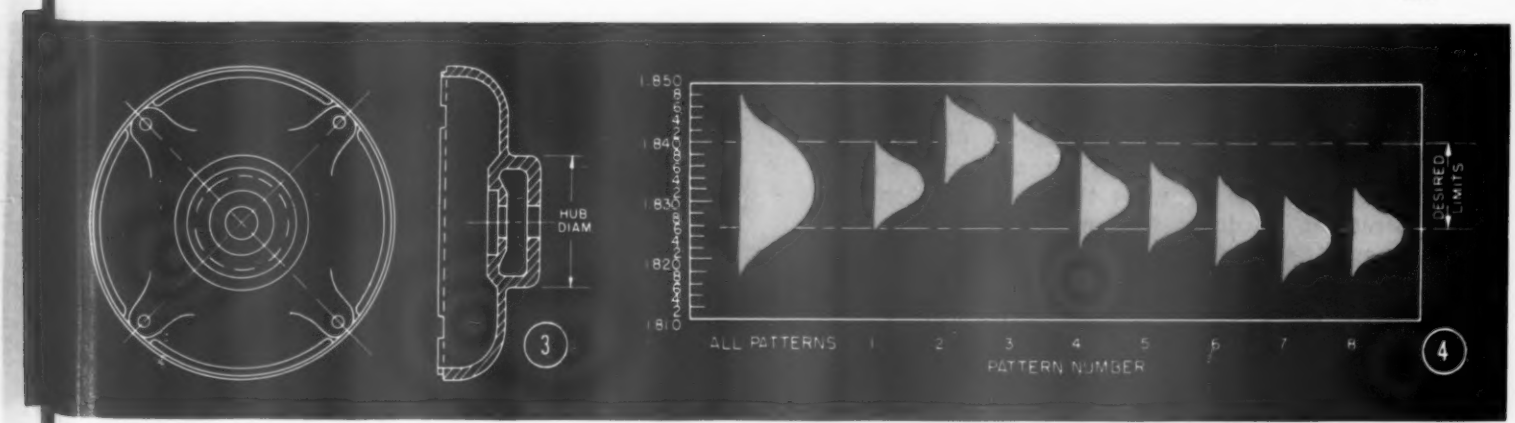
Fig. 1—Control chart covering carbon percentage in test blocks poured at scheduled intervals daily

Fig. 2—Similar chart applying to silicon content

Fig. 3—Sketch of cast end bell for ¼-hp motor

Fig. 4—Frequency distribution curve for outside hub diameter of motor end bell shown in Fig. 3





chining, it is important that the hub diameter be held within rather close tolerances.

The molds for these castings are made from metal patterns. There are two patterns on each pattern plate, thus producing two molds in each cope and drag assembly. Four pattern plates were investigated, or a total of eight separate patterns. Twenty-five castings from each pattern were measured, making a total of 200 measurements. From these observations, the average (X) and the standard deviation ($\sigma$) were calculated, and from this information frequency distribution curves were plotted as shown in Fig. 4.

Then all the 200 observations were thrown together and the average and standard deviation of these 200 observations calculated. The frequency distribution curve shown at the left of Fig. 4 was drawn. From this curve of all patterns together it can be predicted that the machine shop can expect castings the hub diameter of which will vary from 1.816 to 1.848 in. There is a variation of approximately $\pm$.016-in., and naturally it would be difficult for the machine shop to chuck castings which vary so much.

### Variation Between Patterns Is Greater

Examination of the individual patterns demonstrates that in no case is the total range in any one pattern greater than .014 in. or $\pm$.007-in. This means that the foundry can make these castings within a total tolerance of $\pm$.007-in., but it will be noticed that the average of the pattern producing the smallest hub is 1.824 in., and the average of the pattern producing the largest hub is 1.840 in. While there is a difference of only .014-in. between the smallest and largest hub produced in any particular pattern, there is a difference of .016-in. between the averages of the smallest and largest patterns. Stated statistically, there is a greater variation from pattern to pattern than there is within patterns.

The quality control problem for controlling the hub diameter resolves itself into a problem of making the patterns within closer tolerances. Since these are metal patterns, this was not a difficult task. Correction of the patterns reduced the variation between castings and the machine shop was not required to design special chucking devices and lower unit costs resulted.

One of the most difficult and complex quality control problems tackled in the foundry was the attempt to control the hardness of the ¼-hp motor end bells. The machine shop reported trouble machining these brackets and it appeared necessary to anneal all these castings before machining. Production at that time was about 5000 castings per day, and the annealing cost was estimated at approximately 3½ cents per casting, meaning a daily expenditure of approximately $175 for annealing only. A study was made of what the machine shop could tolerate in hardness for machining these castings without first annealing. This study was supplemented by a study in the foundry that determined what the foundry could do without appreciably increasing the cost of producing the castings.

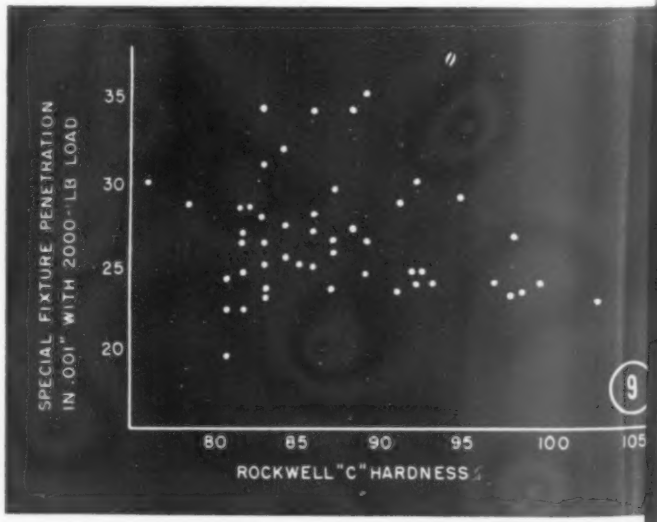
The machine shop reported that it was able to machine only those castings testing below 215 bhn.

One hundred per cent file testing of all castings apparently did not weed out all castings which were not machinable. Therefore, a special testing fixture, consisting of three knife edges, was developed. These knife edges acted as penetrators and were used to test the hardness on the bracket fit of the castings. This test also proved unsuccessful in weeding out unmachineable castings. A scatter diagram of the relationship between Rockwell "C" hardness and the penetration in .001-in. with a 2000-lb load on the special test fixture is shown in Fig. 9. It will be noted that there is not significant correlation. The special test fixture was discontinued as a means of separating unmachineable castings from the machineable ones.

Another proposed method for controlling the hardness of castings was the chill test method. Briefly, this method consists of pouring a test block which is allowed to cool until solid and is then quenched in water. The cold block is broken and the depth of chill is measured in 32nds-in. and recorded. The adequacy of this method was tested by pouring 66 blocks from the same ladle of iron. The frequency distribution of chill depth in these test blocks is shown in Fig. 10. The average depth of chill is about 3/32-in., and the chill depth varies over the range of 1/32-in. to 5/32-in. Test blocks were poured at the same time as chill test blocks from the same ladle of iron and brinell hardness indicated. The correlation between chill depth and brinell hardness, as shown in Fig. 11, was very poor. From this it was decided that the chill test was not suitable for predicting machineability, at least for the present conditions.

Meanwhile, a considerable amount of data had been accumulated in the machine shop showing the physical and chemical properties of "machineable" and "unmachineable" castings. There appeared to be some significant difference in silicon content between machineable and unmachineable castings. Fig. 7 shows the correlation between silicon content and unmachineable castings. While these data in themselves were not taken as final, they led to a more thorough investigation of effect of silicon content on the machineability of this casting and the possibility of using silicon content as a control.

A further study was made to determine the relationship between silicon content and brinell hardness. The purpose was to (*Please turn to page* 272)



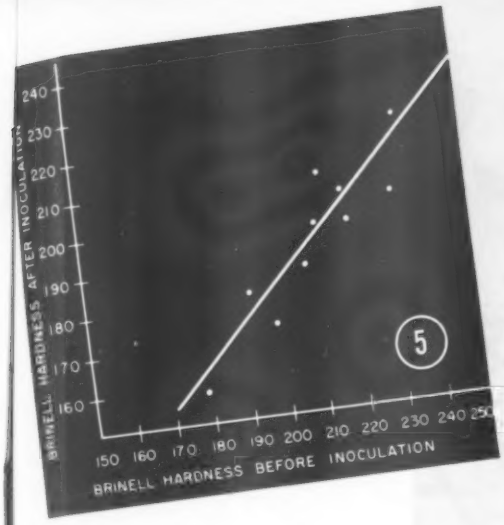



Fig. 5 — Illustrating effect of silicon inoculation on brinell hardness

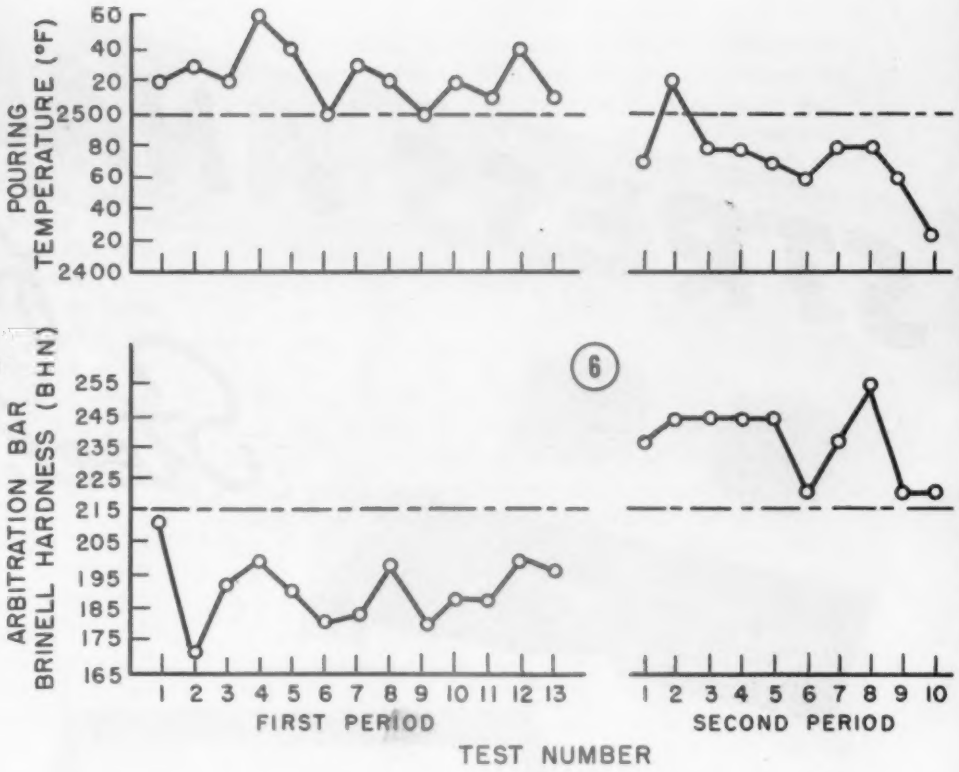



Fig. 6 — Charts showing influence of pouring temperature on hardness

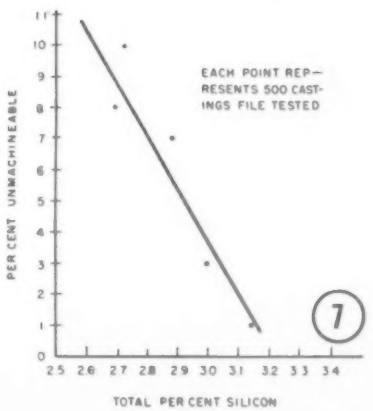
Fig. 7—Correlation between silicon content and unmachinable brackets

Fig. 8—Correlation between silicon content and hardness of arbitration bars after final additions of silicon

Fig. 9 — Correlation between Rockwell hardness and hardness by special fixture

Fig. 10 — Frequency of chill depth tests on one ladle

Fig. 11—Correlation between brinell hardness and chill in 1/32-in.


PER CENT UNMACHINEABLE
EACH POINT REPRESENTS 500 CASTINGS FILE TESTED
25 26 27 28 29 30 31 32 33 34
TOTAL PER CENT SILICON
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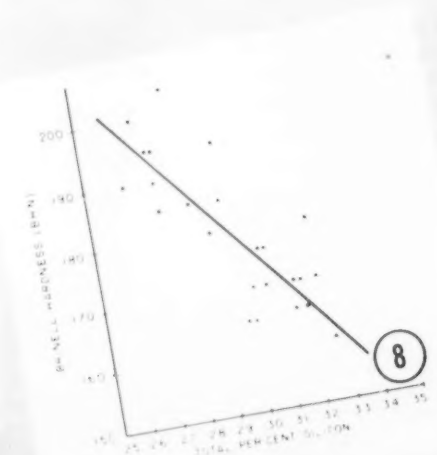


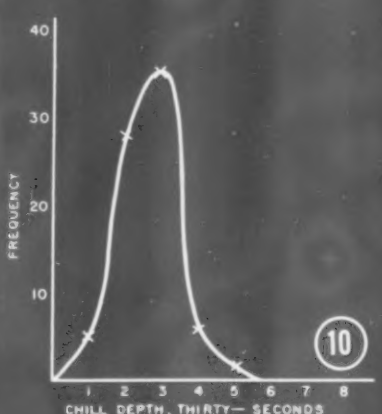


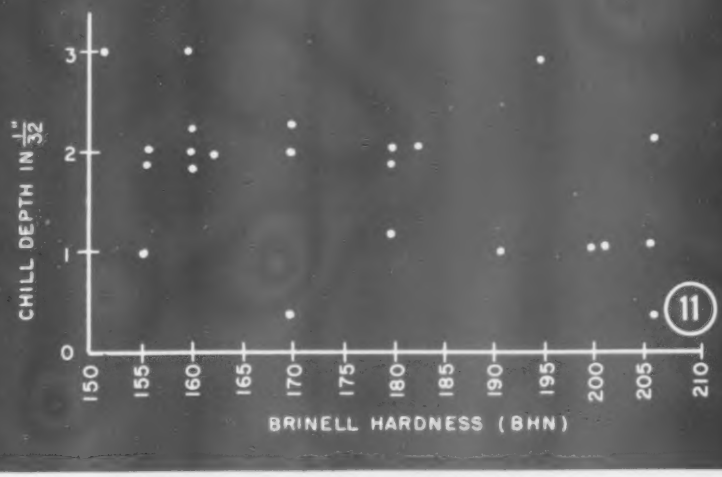

# STRESS ANALYSIS for the Steel Foundry

By ROBERT G. WAITE
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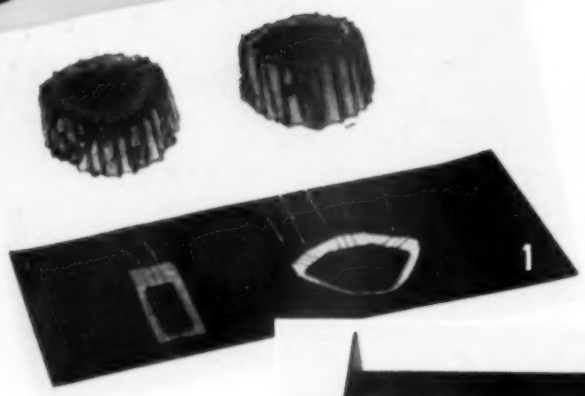


Fig. 1 — Section of the disk, 2 in. in diameter, containing the cemented gage after being removed

Fig. 2—Taking final set of readings on gage piece after removal




Fig. 3—Area to be welded between rolled plate disk and casting

OCCASIONALLY it is necessary to weld plates or sections in openings in castings for the purpose of making a solid wall or pressure-tight and leak-proof compartment. These openings are necessary in foundry practice to maintain wall thickness or core positions to produce internal section members of intricate castings. This paper is the result of a study of both the nature and the magnitude of the residual stresses induced by this welding.

Since very little research work has been published on residual stresses in steel castings, a program was set up to determine the type and magnitude of stress occurring at different stages of production. One of these stages is the welding in or filling these "core support" openings. The following examination covers the procedure and equipment used in this program as well as the results of this investigation.

According to Sparagen and Claussen,[1] residual welding stresses are not constant for a given technique of welding, but they vary with the thickness of the plate, shape of joint, type of steel, cooling rate, and other obvious variables. All four of these variables were kept as nearly constant as possible in our investigation. Six-inch diameter disks were flame cut from cold rolled carbon steel plates. The edges of both the disk and the casting "core support" opening were scarfed to produce the single "V" type joint ready for welding.

Sparagen and Claussen state also that there is no reliable information on residual stresses caused by flame cutting. Their appendixed reference by Wiss gives the data on flame cut plates as shown in Table I, p. 252.

One disk was used, consequently, to determine the possible stress present before welding. Our preliminary tests on this disk gave us the total residual stress—both from cold rolling and from flame cutting. A residual stress of 13,400 psi was recorded. On the basis of these results, all the remaining disks were stress relieved 8 hours at 1250° F followed by slow, furnace cool. Unpublished data on some railroad castings revealed that a stress relief treatment actually reduces residual stresses to a very low figure.

**Equipment**—For obtaining our strains we used the "trepanning method" and Baldwin-Southwark SR4 strain gages. The following equipment was used for measuring strains: SR4 gages, type AR-1 (0-45-90° Rosette), Baldwin-Southwark SR4 strain indicator, switch box, air motor drill, soldering iron, duco gage cement.

For preparation of tests: Air driven cup grinder, and the following welding rods—Wilson No 98N, Wilson No. 106, Sureweld "B", P&H type AP.

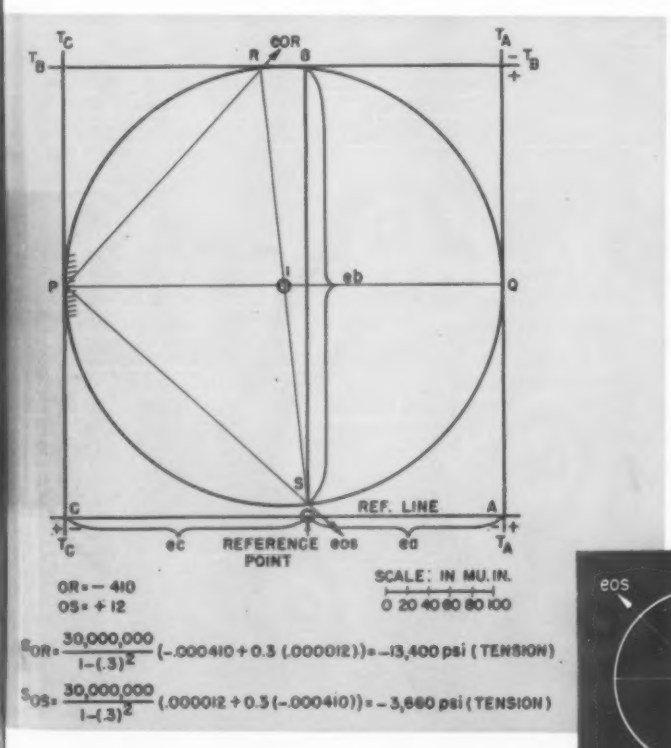
The gages were cemented on a properly prepared surface and allowed to set thoroughly before soldering lead wires onto the gage wire elements. Gages were given a coating of ceresine (wax) to prevent any moisture absorption. Using the strain indicator we obtained a measure of the original conditions. These lead wires were then unsoldered and the trepanning work begun. Essentially, "trepanning" is the removal of a small section of the disk, 2 in. in diam, which contains the cemented gage (Fig. 1), by drilling a series of $\frac{1}{4}$-in. holes in a circle around the gage, following up with a larger drill to remove the remaining walls. When the gage piece is removed, the original lead wires are again resoldered and the final set of readings taken (Fig. 2).

These readings are actually "changes in resistance" (caused by shortening or lengthening of the gage wire) of the gage wires, read by a galvanometer type indicator graduated in microinches of strain. A negative strain will show a relief of a residual tension stress, while a positive strain will show a relief of a compression stress. (Measurements of applied stress would be just the reverse in sign and type.) With these measured strains in three known directions (0-45-90°) at a point, we can calculate the principal stresses by either the Baldwin[2] "graphical solution" or the "dyadic circle solution"[3] by R. G. Sturm.

**Procedure of Tests**—The "supposed" direction of rolling was stamped on each disk using a series of punch marks. We mounted all gages so that the 45° gage was in line with these punch marks. Our first test on the flame-cut disk (not stress relieved) bore out our prediction as to the "direction of rolling" and also showed the need of stress relief. Data on this test are shown in Table II.

Using the "dyadic circle" method we calculated the principal stresses, which gave 13,400 psi and 3660 psi tension respectively. Method of calculation is presented in Fig. 4.

Six different welding sequences were decided upon, using four different welding rods. All six sequences were cases of arc welding with restraint. The same type and size of casting was (*Please turn to page* 252)



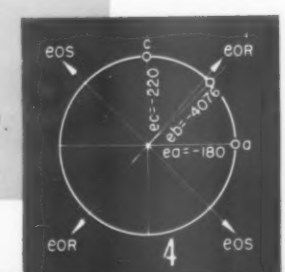




Fig. 4—Dyadic circle method[3] of calculating principal stresses

By ARTHUR H. ALLEN
*Detroit Editor*
THE FOUNDRY

# CORE DIPPING AND SPINNING

IMPROVED engine block castings for Ford V-8 power plants have resulted from major changes in equipment and practices used in the coreroom at the production foundry of the Rouge plant. In all some $3 million was spent in revising various assembly techniques, materials handling and processing of the various cores required for the engine.

Probably the most important change has been made in the assembly and dipping of jacket and barrel cores. Formerly each of the core sections for the block was dipped and dried separately, after which they were pasted together in conventional fashion. Frequent troubles with webs of metal forming in crevices where the core sections were not pasted tightly, resulting in obstructions to water passages and rough exhaust and intake port passages, led to a revision of the entire method.

The basic core assembly comprises four intake ports, one center port, two end ports and deep and shallow jackets. All these elements are blown on special types of coreblowing machines. Fig. 1, for example, shows an ingenious turntable unit for blowing the deep jackets at a rate of 300 per hour. Fourteen fixtures for holding the coreboxes are mounted on the turntable which revolves under the blow head and sand hopper at the right. Hydraulic cylinders raise the fixture as it comes under the head, holding it securely under the rubberized blow plate. A system of dogs and limit switches is provided so that the blow head follows the motion of the table for about 15 inches of travel while the core is being blown, then releases and reverses travel to pick up the next box. Excess sand falls through a floor grating and is returned to the system. Cores are removed from the turntable and placed on an adjacent conveyor which transfers them to baking ovens and then to the core assembly department.

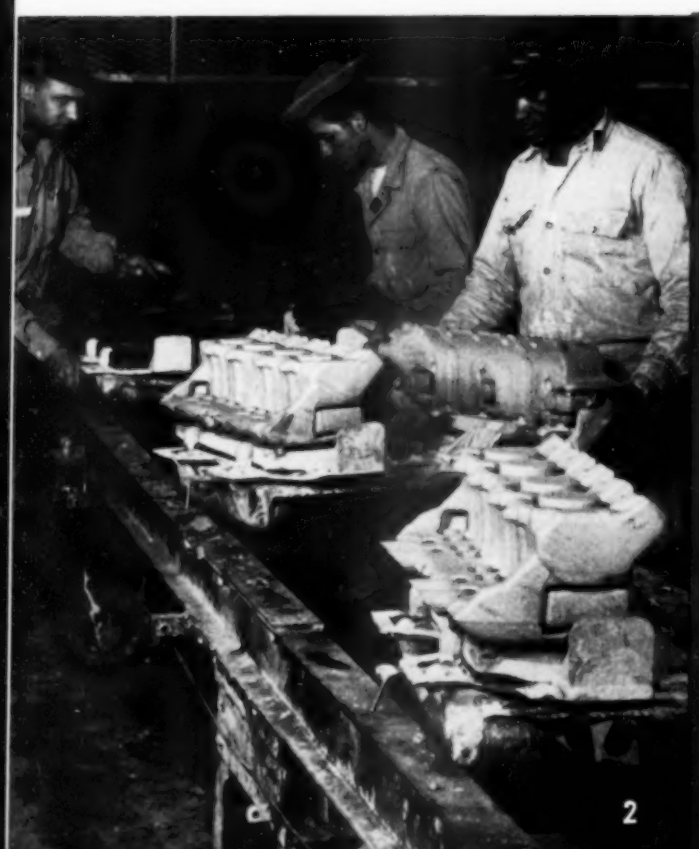
Perhaps the most interesting unit in the barrel and

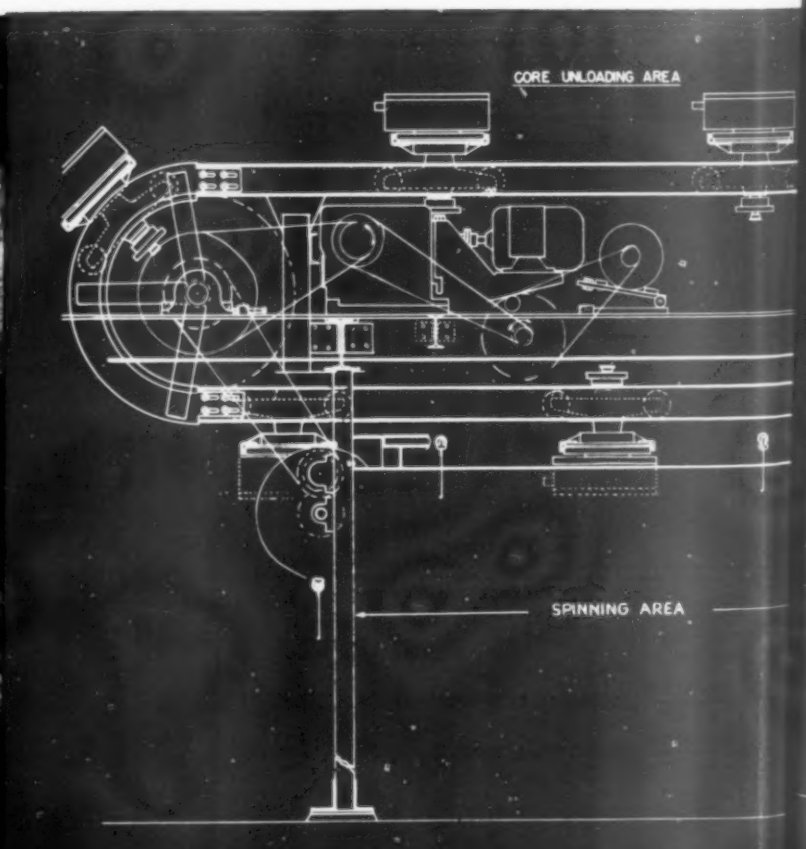
Fig. 1—Turntable unit for blowing deep jacket cores at rate of 300 hourly. Operator at right controls blowing head under which the fixtures index

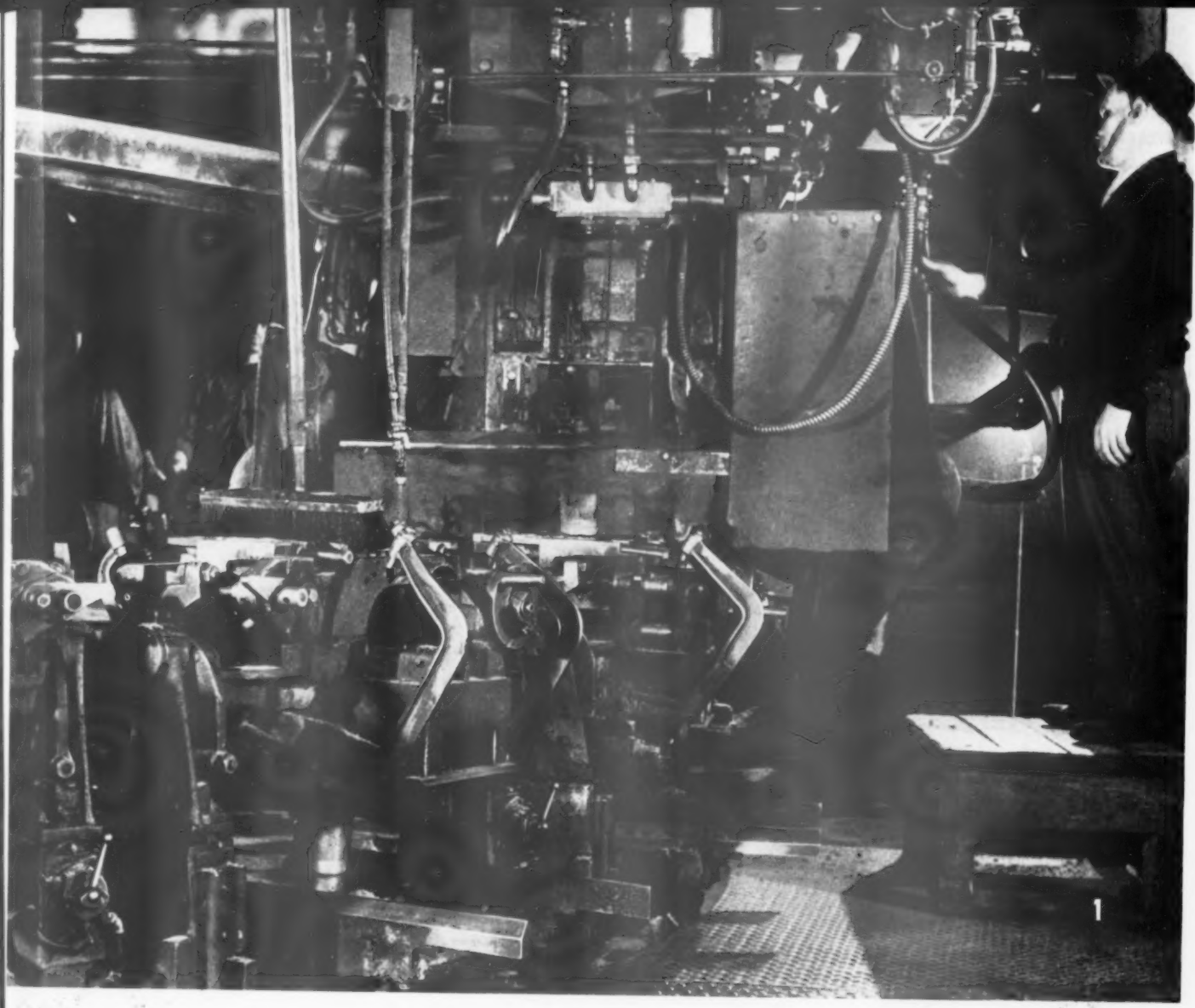
Fig. 2—Two cores are positioned and locked onto fixture plates preparatory to being conveyed to dipping and spinning operations beneath the floor

Fig. 3—Schematic drawing showing elevation details of the automatic dipping and spinning conveyor and subfloor tank. Cam provides the requisite raising and lowering of the tank so the cores will be submerged completely









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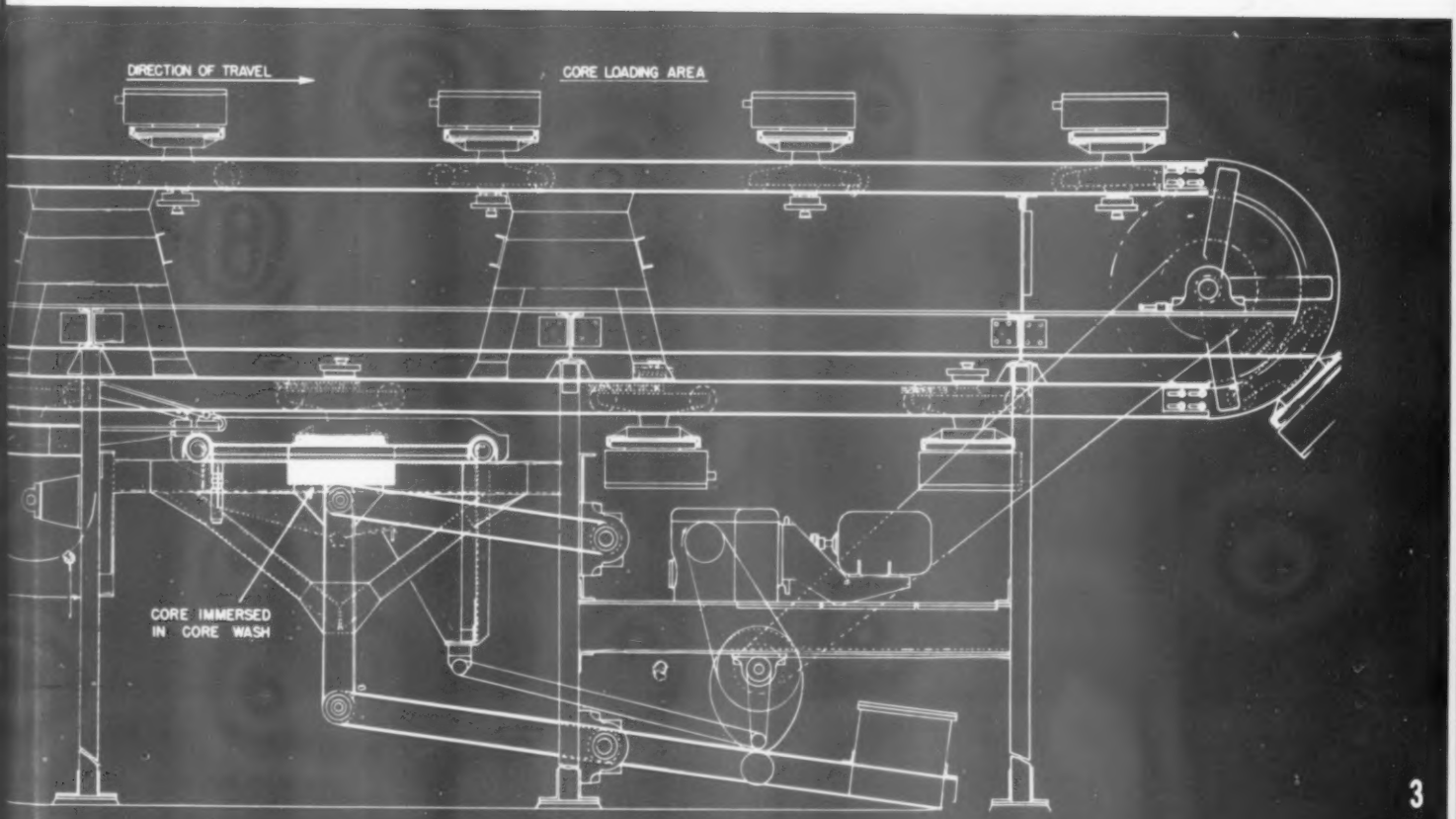
DIRECTION OF TRAVEL
CORE LOADING AREA
CORE IMMERSED
IN CORE WASH

3

jacket core assembly operation is an automatic dipping and spinning machine. This unit, shown in the accompanying drawing (Fig. 3) and illustrations, is simply a conveyor loop which carries 14 fixtures or platforms on each of which two complete core assemblies are loaded and locked securely in position. The conveyor chains carry the fixtures around the sprockets at the right and down to a subfloor area where a large dip tank carrying the refractory dipping material is arranged to raise and submerge the inverted cores in the liquid, traveling along with the fixture and then lowering and retracting.

An intricate system of levers, arms and cams hooked up to a motor drive provides the necessary motion to the wash tank. As the cores emerge from the tank and while they are still in the inverted position a worm shaft engages a pinion on the fixture and rotates it at 90 rpm for 9 seconds to throw off all excess wash, which falls into another tank and is returned to the main dipping tank. Following this, the fixtures are carried back up above the floor where the cores are removed and placed on another conveyor which transfers them to bake ovens.

When the ten cores are assembled before being transferred to the dipping operation, the two jackets

Fig. 4 — Dipped and spun cores are removed from the fixture and transferred to an adjacent conveyor which moves them to drying ovens

Fig. 5—View beneath the floor level, with a pair of cores about to be submerged in the tank of refractory wash

Fig. 6—After emerging from the dip tank a work shaft engages a central pinion on the fixture and rotates it to remove excess wash. Here the fixture has stopped spinning and is traveling back to above-floor level for unloading

are bolted together with four bolts, while the ports are positioned accurately with locating fixtures. Ports, jackets and barrel cores are pasted before the assembly moves to the dipping conveyor. Careful inspection and repair also is carried out after the components are assembled.

There are 26 core assemblies on the machine at a time, since each fixture accommodates two and there is one idle station for loading and unloading. Each assembly weighs 48 pounds. The two cores on a fixture are held to the base plate by cam-action clamps in front and a V-block at the rear, this being necessary to hold the core on the fixtures when they are inverted during dipping and spinning.

Fixtures on the dipping conveyor travel in side rails or channels spaced about 2 feet apart, and they are propelled by two chains, one at each side, which ride over a pair of large sprockets at either end of the unit. Sprocket shaft is driven by chain from a motor and speed reducer. The machine will dip and spin approximately 550 cores per hour. It has proved an effective means for getting a good seal on the core assembly as well as for obtaining a uniform coating on all sections. Result has been much cleaner castings and the disappearance of metal flash in port openings and water passages.

# Progress report on Nodular

By CHARLES O. BURGESS
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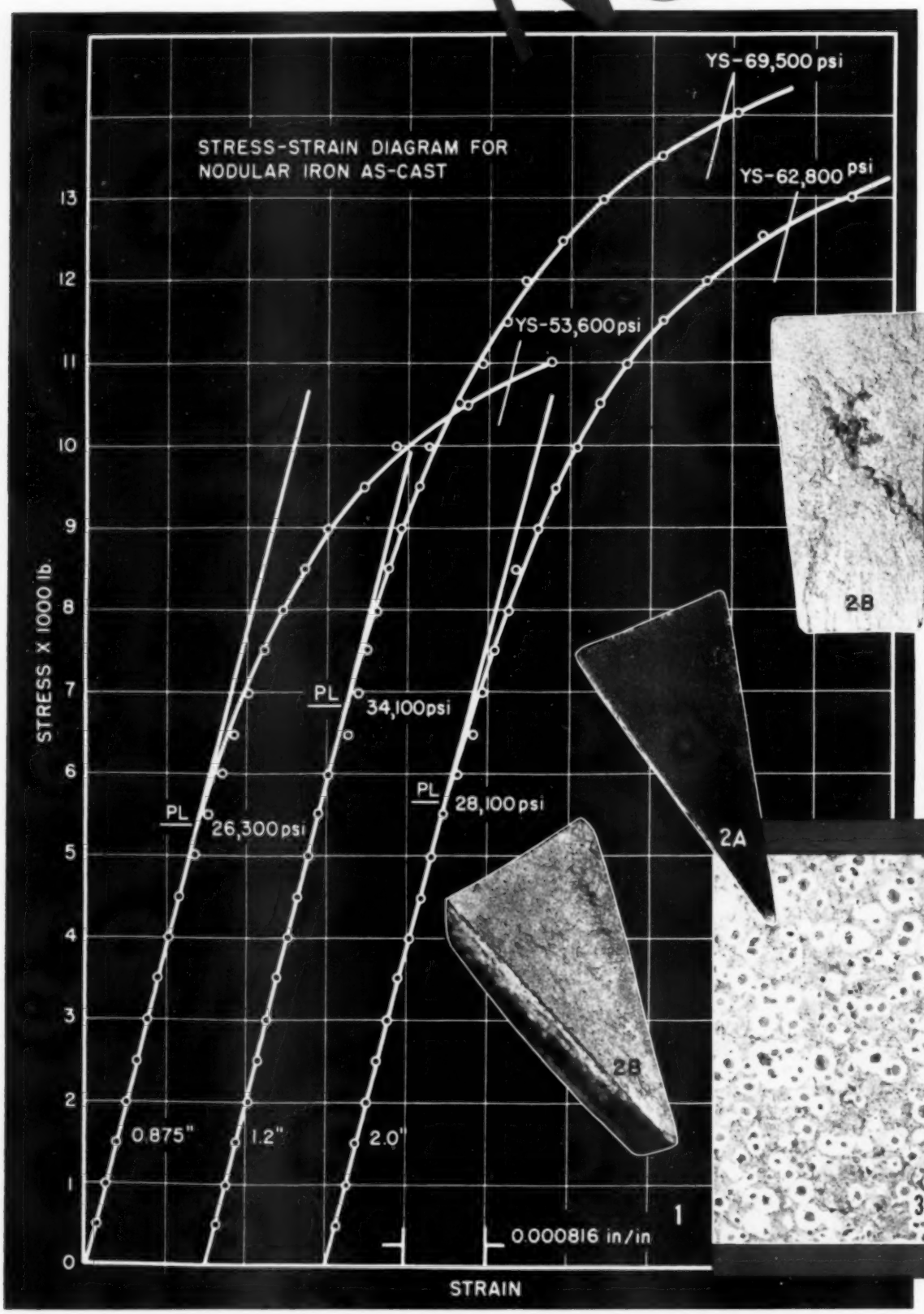


Fig. 1 — Stress-strain diagram of three sizes of arbitration bars cast from cerium-treated irons

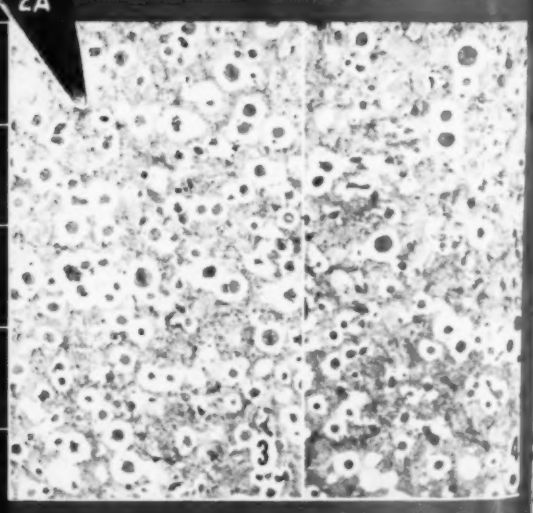









Fig. 2 — Fractures of chill blocks and wedge type chills of gray iron before *(A)* and after *(B)* cerium treatment



# Iron

ANYONE attempting to define the nodular iron process in this early development stage is assuming a great deal of responsibility. It is well known that the whole development is in a condition of flux and progress is so rapid that information correct today may be outdated tomorrow. However, the whole development of nodular iron is so important to the gray iron industry that a progress report is deemed essential. The present contribution is intended as such a report.

There is no question that development of nodular or spheroidal graphite in gray iron, instead of the normal flake graphite, is a culmination of a dream that foundrymen have had for over one hundred years. As a result the gray iron foundryman will be able to expand the field of application of his product. If history repeats itself, this will mean increased acceptance of the casting process with a greater demand for all cast components.

Means of accomplishing this process have been nibbled at by various investigators, including the writer, who reported such structures in irons treated with desulphurizers as early as 1938. Such structures have been obtained at other places in the past, but they were never considered of sufficient commercial interest to justify the trouble and expense involved. Finally the British Cast Iron Research Association announced at the American Foundrymen's Society's annual meeting last May that a workable process for producing nodular type gray irons of measurable ductility, had been developed. The process depended on the use of cerium. The British Cast Iron Research Association deserved all the extravagant praise that was showered on it at the time of its announcement. Both Messrs. Morrogh and Pearce predicted that further research would develop new methods and additional elements capable of producing nodular iron.

The remarkable properties exhibited by the cerium-treated irons closely resemble those obtained using magnesium instead of cerium as the nodulizing agent, and will be discussed in more detail later. In fact, at the time of the British announcement, the International Nickel Co. indicated that it had obtained somewhat similar results using magnesium.

Causes of the observed phenomena naturally intrigue all foundrymen. Unfortunately, explanations offered for conversion of graphite from a flake to nodular form in gray iron simply by additions of small amounts of either cerium or magnesium, are very unsatisfactory. Certain conditions do, however, appear to be essential.

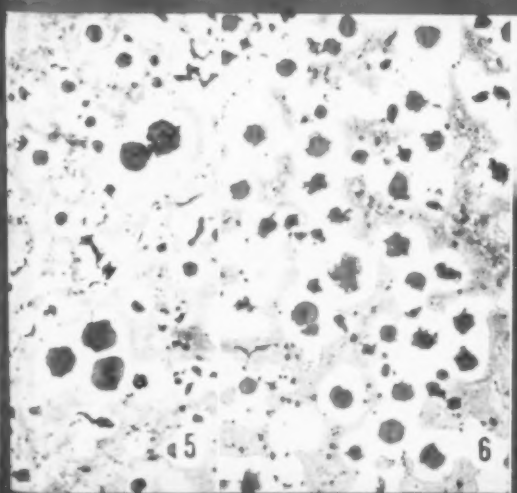
1. The sulphur content of the iron must be reduced to the unusually low level of approximately 0.02 per cent, whether this end is accomplished by using a heat initially low in sulphur, by adding cerium or magnesium in excessive amounts so as to bring the sulphur down to a low level, or through some other means of sulphur reduction.

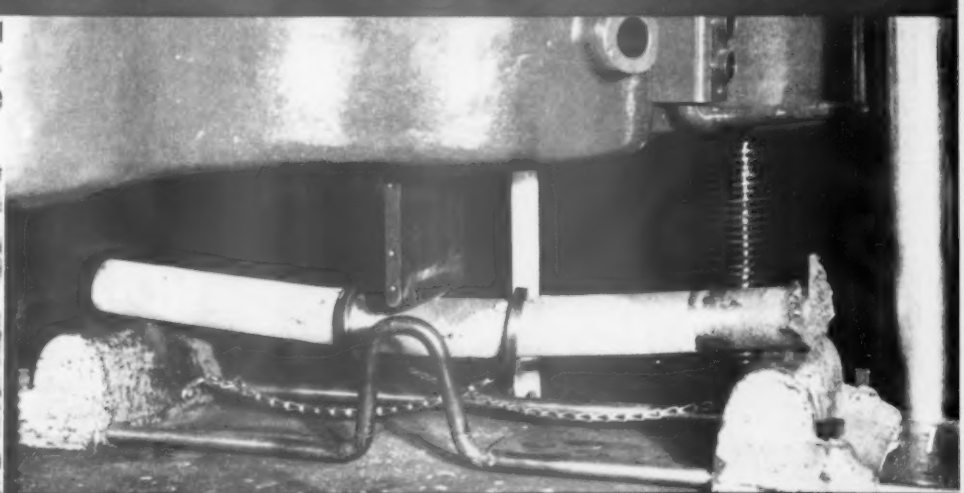
2. The added element appears in every case to suppress graphite formation at normal temperature; in other words, it behaves as a carbide-stabilizing element. This behavior is so marked that it is necessary to use some type of ladle inoculant in addition to the nodulizing element (such as 75 per cent ferrosilicon, SMZ, Graphidox, Nisiloy, etc.) to prevent nodular irons solidifying in a mottled or white condition.

The foregoing two requirements appear to be well established. When we remove to other theories, how-

Figs. 3-6—Typical structure of cerium-treated cast iron. Fig. 3—Wedge chill block. Fig. 4—0.875-in. diameter bar. Fig. 5—1.2-in. diameter bar. Fig. 6—2.0-in. diameter bar

Fig. 7—Typical plastic deformation of 2.0 in. diameter bar of nodular iron previous to fracture



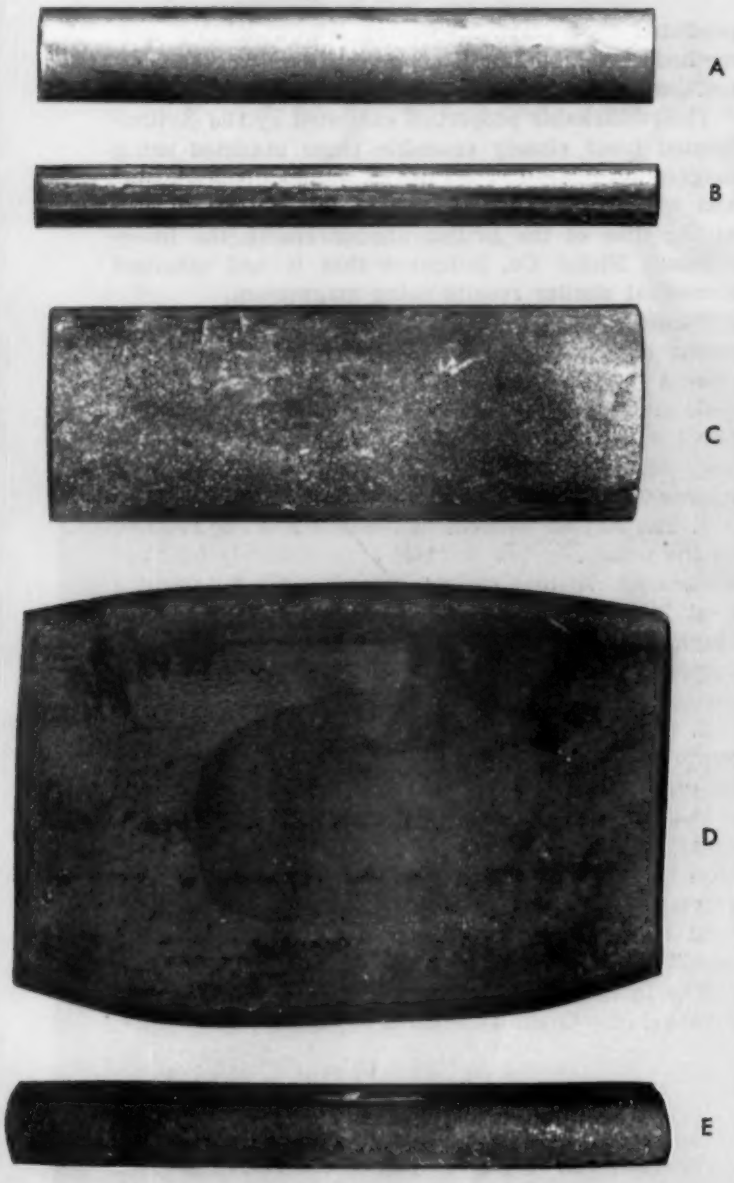



Fig. 8

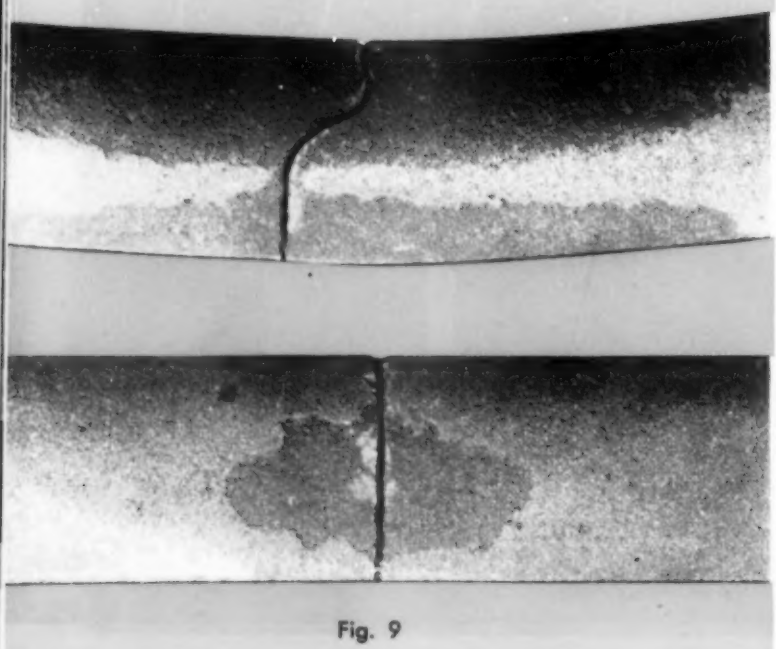


Fig. 9

**TABLE I—Physical Properties of Mg-Treated Iron**

| Analysis, Per Cent | | | | | |
|---|---|---|---|---|---|
| TC | Si | S | Mn | P | Ladle Addition |
| 3.51 | 2.13 | 0.040 | 0.61 | 0.10 | 0.75 Mg scrap<br>0.40 Si |

| Tensile Tests on Keel Block Coupon Bars | | | | | |
|---|---|---|---|---|---|
| | Tensile Strength, 1000 psi | Yield Point, 1000 psi | Elongation, % | Reduction of Area, % | Charpy V-notch Impact |
| As Cast ..... | 82.5 | 49.2 | 11.2 | 9.8 | 6.5 |
| Annealed, 1 hr at 1650° F .. | 69.6 | 45.1 | 20.4 | 19.6 | 11.0 |

ever, such as those of Prof. Albert De Sy of Belgium, which involve production of cubic type inclusions, suppression of $SiO_2$ formation, and nucleation by such inclusions of spheriodal rather than flake graphite, we are on more uncertain ground. All of these observations are of interest since they indicate that other elements—such as calcium, strontium, lithium, titanium, zirconium—that form cubic compounds and are desulphurizers, may be effective in the nodulizing treatment. In fact, some success with the use of lithium has recently been reported by Prof. De Sy.

Immediately following the announcement by Morrogh of the BCIRA of their process, the writer checked the results reported in Morrogh's paper by the preparation of a number of cerium-treated, gray iron heats at the Union Carbide & Carbon Research Laboratories in Niagara Falls, N. Y. Messrs. Morrogh and J. G. Pearce, director of BCIRA, were present during the first of a series of five heats, and stated that they were the first nodular iron heats using the cerium process made in the Western Hemisphere. The resultant irons, both as concerned structural and physical properties, confirmed the British claims and, in fact, exceeded these claims in several instances.

In accordance with their original instructions, a base iron containing approximately 3.7 per cent total carbon, 2.6 per cent Si, 0.03 per cent S, and 0.02 per cent P was employed. The addition of approximately 0.10-0.15 per cent cerium in the form of mischmetal was sufficient to convert the graphite from a flake to a nodular form. Introduction of the cerium either was followed or combined with the addition of 0.50 per cent SMZ alloy as an inoculant, all additions being made in the ladle. Recoveries of cerium approximated 70 per cent.

A standard wedge-type chill block and 0.875-in., 1.2-in. and 2.0-in. diameter arbitration bars were cast from these heats. The structure of these test bars is shown in Figs. 3 to 6. It is of interest that, despite the fact some quasi-flake graphite is shown in the photomicrograph of the 1.2-inch bar, this bar possessed strength and deflection at least equal to that of any of the other bars. It tends to confirm the fact that

Fig. 8—Illustrating hot-working tests on cerium-treated nodular iron. *A* is ½-in. bar successfully rolled to 5/16-in. diameter rod *B*. *C* is 1⅛-in. diameter bar which was reduced to 5/16-in. plate free from cracks or edge checking, as shown in *D* and *E* (end view)

Fig. 9—Typical method of fracture of 2-in. diameter bar of nodular iron (top) compared with fracture of flake graphite iron (bottom)

This quasi-type graphite actually is strikingly different from normal flake graphite as concerns any adverse effect on strength and ductility.

Fig. 2 illustrates fractures of chill blocks and wedge-type chills of the same gray iron heat before (specimens *A*) and after (specimens *B*) treatment with 0.11 per cent cerium. The sharp change in color of the iron from a normal gray to a steely lustre is clearly evident. Incidentally, the chill depth, although difficult to determine on the cerium-treated iron, is approximately the same as that shown for the untreated iron. However, without the addition of 0.50 per cent SMZ, it would have been considerably greater. It is of interest to note that some shrinkage occurs in the case of the rectangular shaped chill from the treated iron (*B*). Such shrinkage is always more evident in nodular irons and is one of the problems that must be faced in the development of this material.

Fig. 1 shows stress-strain diagrams run on tensile specimens machined from the three sizes of arbitration bars cast from the treated irons. These irons showed yield points varying from 54,000 to 70,000 psi and ultimate strengths from 71,000 to 94,000 psi. Moduli of rupture varied from 23.4 million to 24 million. Up to 4 per cent elongation was shown by the nodular irons as cast, and 12 per cent elongation after one hour at 1400° F. It was evident that nodular irons behave differently than normal flake graphite irons in that they possess perfect elasticity up to comparatively high levels—26,300 to 34,100 psi. High yield points are shown by this material, as illustrated in the figure, and it is of interest that although neither Morrogh nor Donoho state that definite yield points could be determined, the operator of the tensile-testing machine stated that he could pick up a definite yield point in the present irons by a change in loading rate; a fact confirmed in later tests.

The unprecedented improvement in mechanical properties following the nodular treatment is evident when it is realized that flake graphite irons of the present composition would be expected to have a maximum

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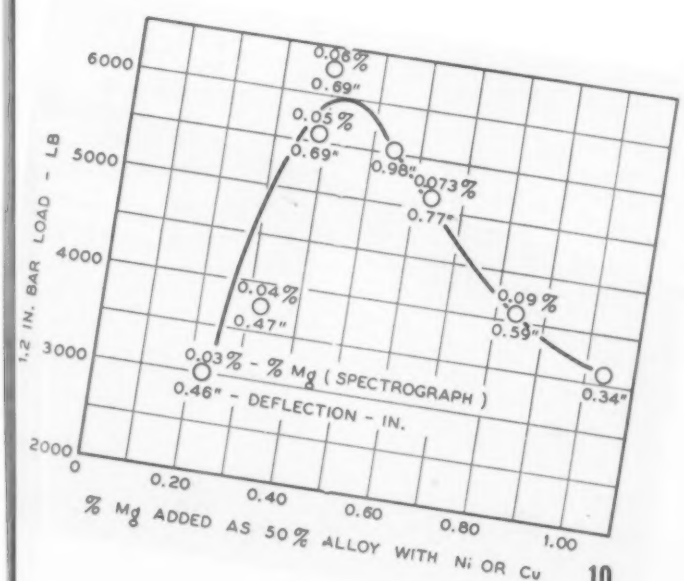
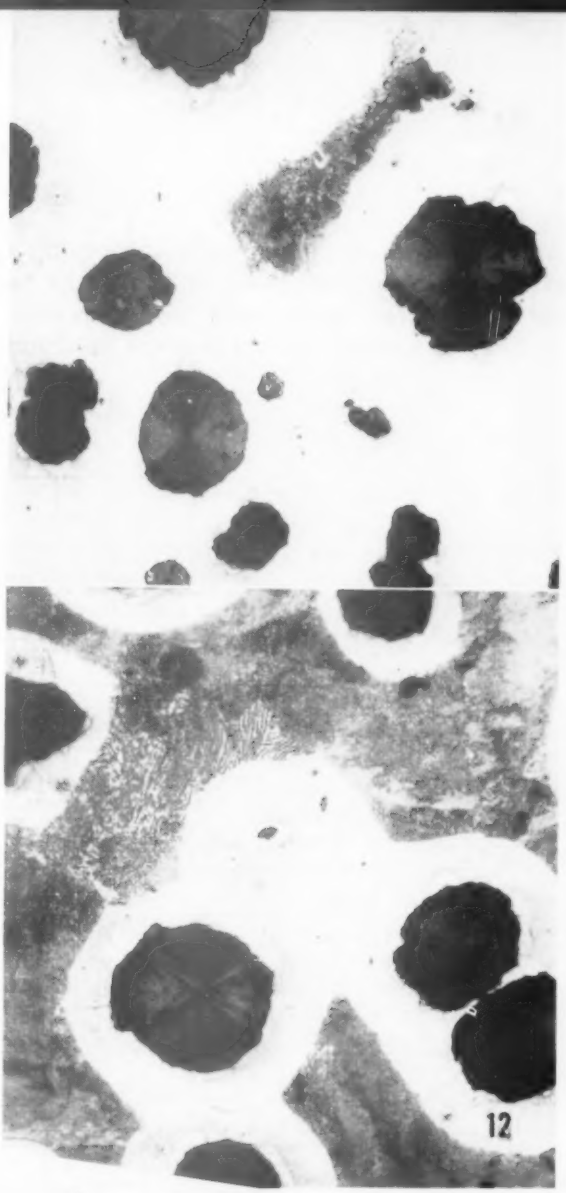


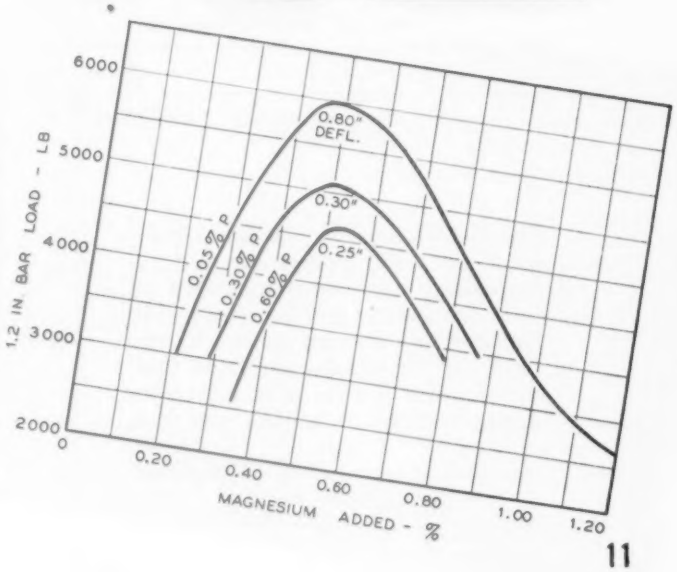




Fig. 10—Influence of varying additions of magnesium on the breaking load of a 1.20-in. diameter bar

Fig. 11—Effect of phosphorus content on properties of magnesium-treated irons

Fig. 12—Typical structure of magnesium-treated iron. Top panel shows annealed structure, bottom as-cast. Iron contains 0.05 per cent Mg

# Establishing the

*The author stresses the importance of knowing how far prices can be reduced before the manufacturer is unable to recover his operating costs. Simple methods for determining the break-even point and out-of-pocket line for various departments of the foundry are explained*

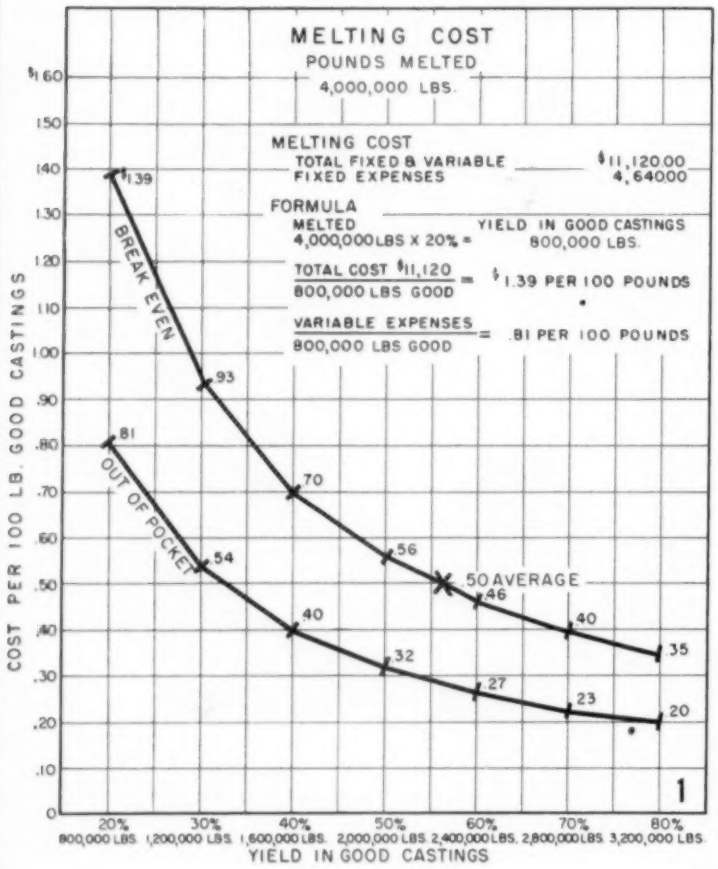



Fig. 1—Showing how the break-even point and out-of-pocket line vary in the melting department according to the yield in good castings

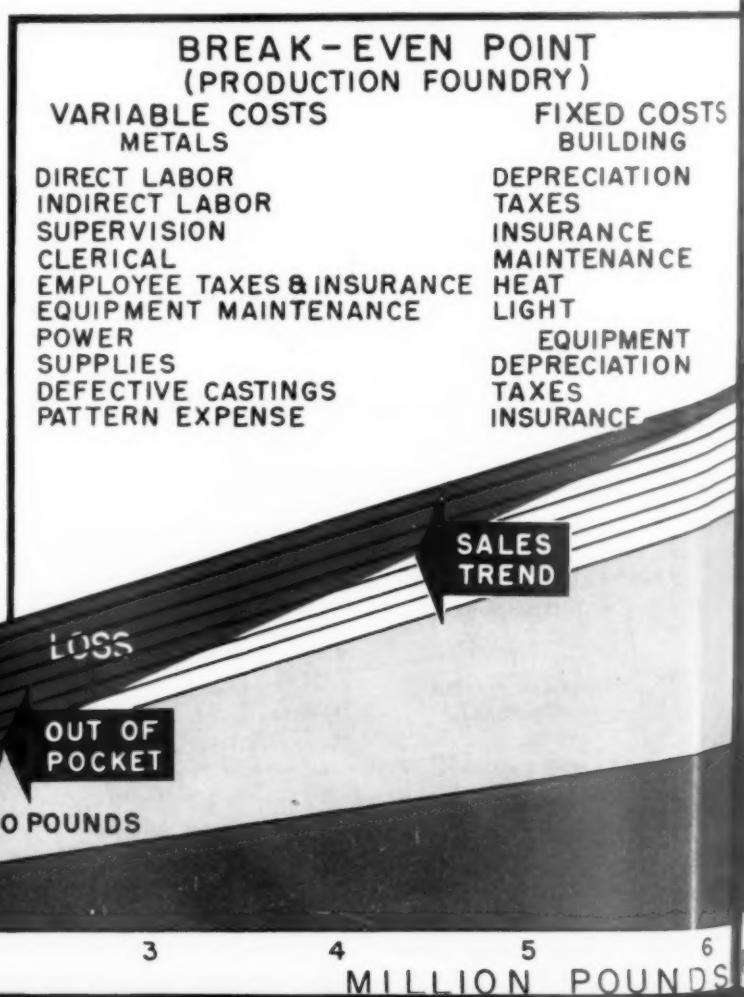
Fig. 2—Chart showing method of arriving at the break-even point and out-of-pocket line for a foundry producing castings of uniform size and type

Fig. 3—Cost per 100 lb of chipping and grinding castings

A GREAT deal of emphasis is being placed by manufacturers, industrial engineers and accountants on the "break-even point"—the sales price at which the acceptance of manufacturing orders will recover the entire operating cost of the enterprise.

Anticipating the probability that as production volume declines there will be insufficient business to allow every producer to recover his entire operating cost, it becomes extremely important that management knows just how far it can go in lowering its price structure before it fails to recover the materials, labor and variable expenses incurred by the acceptance of the business. This is commonly called the "out-of-pocket line."

The fact must be accepted that there will be no restriction placed on foundries who may bid for business below the break-even point. Therefore, the wise foundryman will see to it that he enters competition with a scientific prepared basis for the establishment of a sales policy for each casting to be produced, so



# Break-Even Point

By ALBERT E. GROVER
*Cost Engineer*
Cleveland

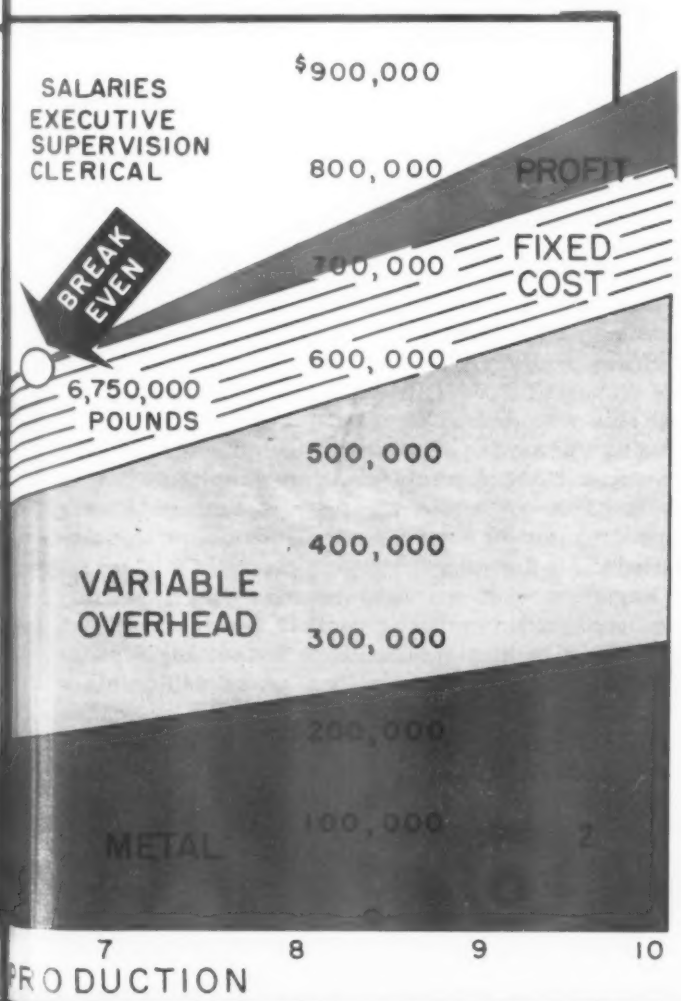
as to be in a position to select the work that is most profitable, considering the particular operating facilities used in his foundry. Furthermore, to stay in business he may be compelled to meet competition at a price that cannot possibly return a profit on his invested capital nor recover his fixed expenses. Therefore, it is extremely important that estimating bases be so established that quotations of casting prices will always be above the out-of-pocket line.

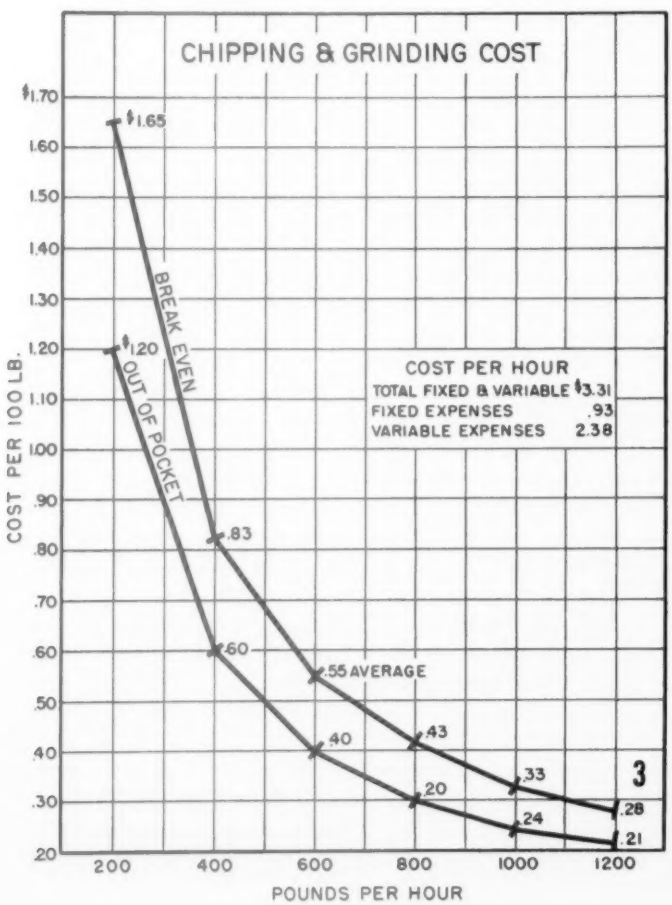
Establishment of a dependable method for calculating costs of individual jobs in a foundry requires the application of common business sense, coupled with the realization that averaging unrelated cost factors always result in misleading information. Many times such misleading information does more damage to the pricing policy than guesses.

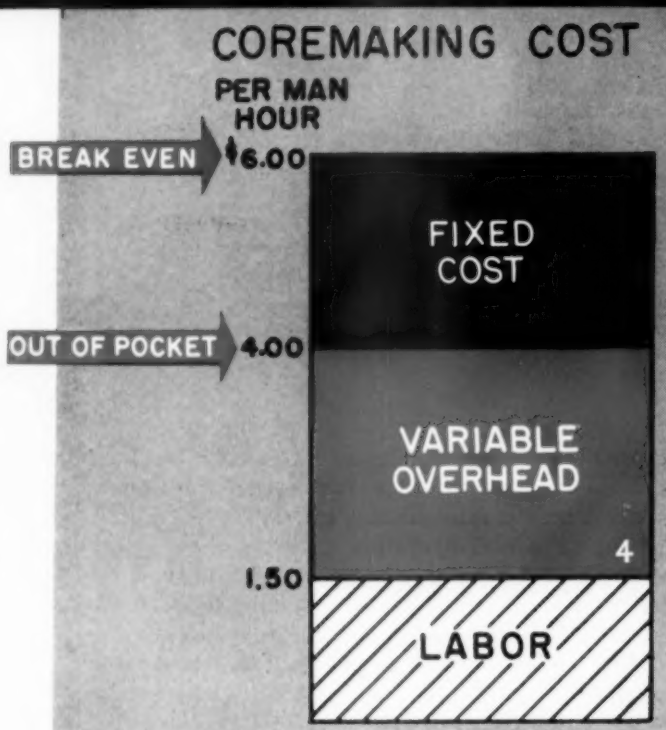
Foundrymen generally base their estimating data on normal operations, either by (a) averaging actual operating costs over past year, (b) using tonnage shipped in periods of estimated normal operation, (c) using an arbitrary percentage of tonnage shipped in any previous period of highest production, and (d) consideration of the physical capacity of the foundry to convert metals into suitable castings.

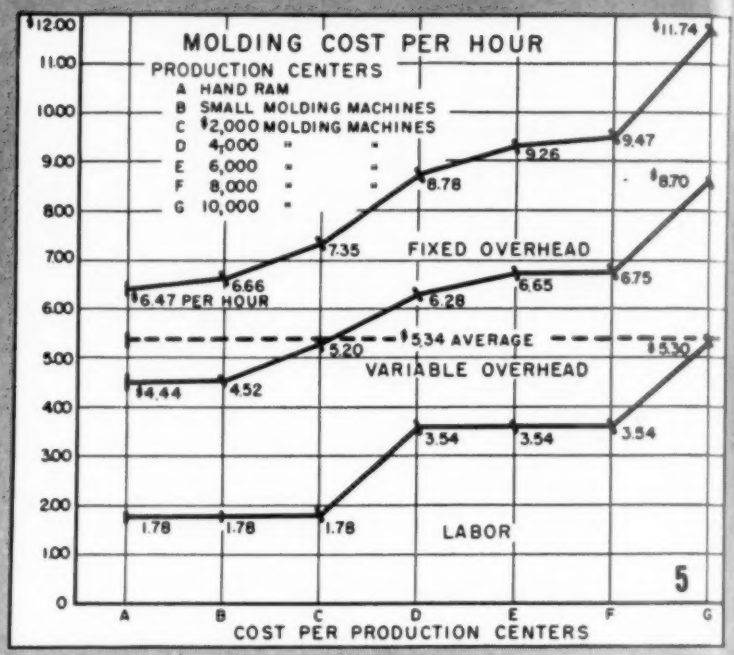
Averaging actual operation costs over past years is an unsound basis, because the average is very likely to be different from actual conditions today. These differences are largely due to improved operating facilities, methods of wage payments, types of castings produced, as well as to changed conditions in the foundry industry in general.

Using tonnage shipped in periods of estimated normal operation does not take into account the constant changes in types of castings from year to year. For instance, the year selected as a basis for establishing normal operation might show a production of 500 pounds per molder-day; today the foundry might, either by increased efficiency of its men or by making a different type of casting, produce 700 pounds per molder-day. Neither does this basis take into account the variations in weight produced by different molders in the same day or by the same molder in






different days.

Using an arbitrary percentage of tonnage shipped in any previous period of highest production is unsound, because:

1. The selected period might not represent the highest possible production obtainable from the operating facilities then being used. The selected period might, on the other hand, be at a time when the demand for castings required operating the foundry more than the usual working hours per day.

2. The tonnage produced in the selected period in comparison with the tonnage produced at present might be influenced by increased efficiency of facilities or operators, perhaps both.

3. The type of castings being produced in the selected period might have been so different in character as to influence the daily output.

Consideration of the physical capacity of the foundry eliminates those irregularities of job costs caused by changed operating conditions as well as changes made in the type of product.

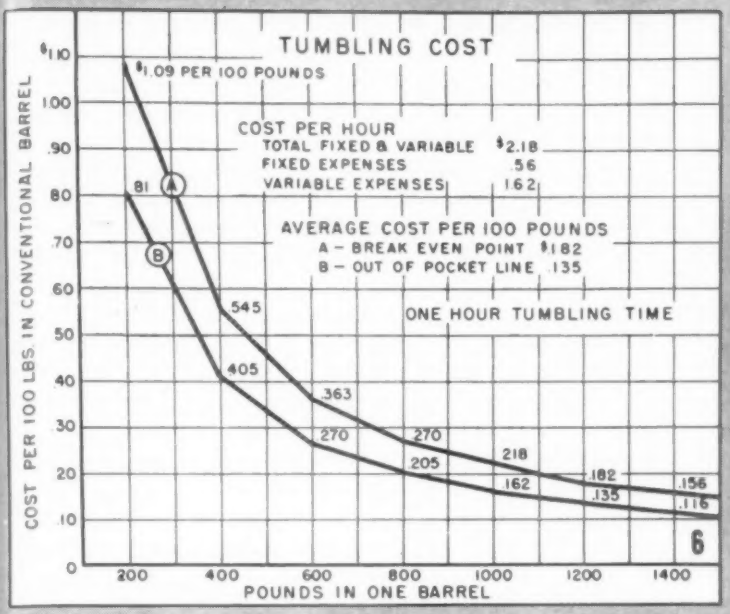
Some foundries produce a standard line of castings, that is, a continuous flow of the same patterns day in and day out for consecutive months and perhaps years. These foundries are commonly called production foundries. Other foundries confine their activities to the production of shapes and sizes of castings to suit the immediate needs of customers. Such foundries are known as jobbing foundries. Still other foundries produce both production and jobbing work.

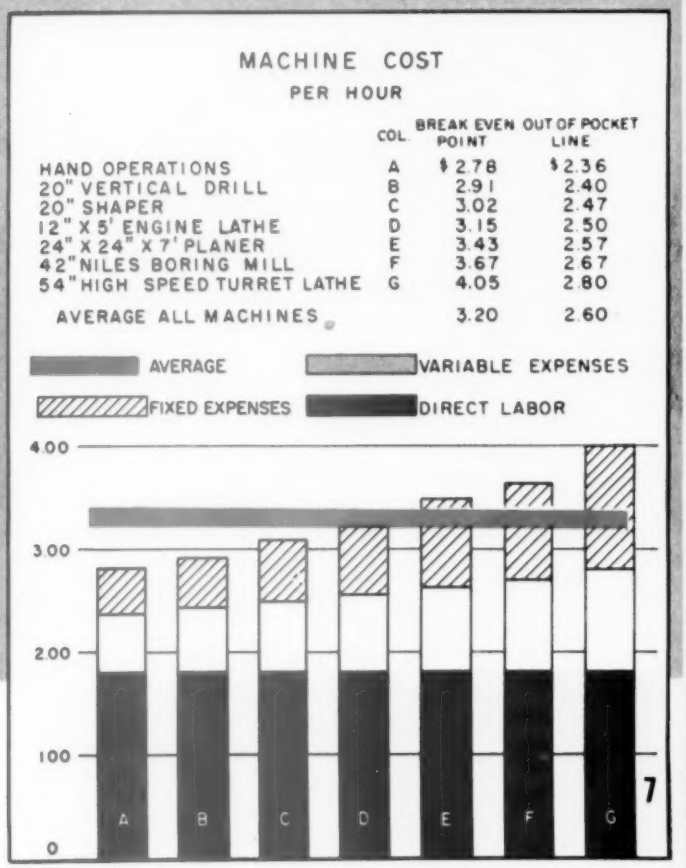
It matters little whether the foundry makes a standard line of castings, strictly jobbing, or a combination of both. Similar operations are necessary to convert metals into castings, therefore the manner in which costs are determined would not vary greatly. However, the differences in facilities and methods used in different foundries or in the same foundry may have a decided influence on the production costs of individual jobs. For example, the same foundry may pour the iron at the molders' floor on some types of work, and convey the mold to the melting point on other types. Differences in facilities and methods of melting, coremaking, cleaning and other operations may likewise influence the final cost of castings of different types.

In consideration of the foregoing, certain sound principles of cost procedure must be followed if management is to be enabled to establish a sales policy that will permit it to meet competition and secure the maximum return on investment in metals, direct labor and other expenditures necessary to produce each job. Extreme care must be exercised that averages are used only when there is a definite relationship among the various elements of costs that go to make up departmental and production center rates. In other words, *you cannot average unrelated things and secure a very sensible result.*

Ernest F. DuBrul, retired manager of the National Machine Tool Builders' Association, tells the story of the man who desired to cross a river and, while discussing the matter of securing a boatman to row him across, a bystander informed him that the *average* depth of the river was 2½ feet. Acting on this information he attempted to wade across, which resulted in his drowning.

Engineers, cost accountants and foundry operating management must agree that the measurement of production in a specified time is the true foundation for all operations in a foundry, as well as other industries. On this basis wage payments are calculated, whether they be in the form of premium, piece work, or straight hourly rates. It matters not whether the measurements be expressed in weight or pieces, the original foundation is production per hour, day, month, year or any other designated period. The establishment of normal operation on a time basis is




| | COL. | BREAK EVEN POINT | OUT OF POCKET LINE |
|---|---|---|---|
| HAND OPERATIONS | A | $2.78 | $2.36 |
| 20" VERTICAL DRILL | B | 2.91 | 2.40 |
| 20" SHAPER | C | 3.02 | 2.47 |
| 12" X 5' ENGINE LATHE | D | 3.15 | 2.50 |
| 24" X 24" X 7' PLANER | E | 3.43 | 2.57 |
| 42" NILES BORING MILL | F | 3.67 | 2.67 |
| 54" HIGH SPEED TURRET LATHE | G | 4.05 | 2.80 |
| AVERAGE ALL MACHINES | | 3.20 | 2.60 |

Fig. 4—Make-up of costs in production of cores
Fig. 5—Molding cost per hour according to type of method and machine employed
Fig. 6—Tumbling cost in relation to weight of castings in conventional barrel
Fig. 7—Machining cost with various type units

important.

The fundamentals of normal establishment on a time basis are as follows: Available working time for the 365-day year may be arrived at by deducting 104 days for Saturdays and Sundays, 10 days for vacation allowances, 6 days for legal holidays and 5 days for other plant shutdowns. This leaves 240 available working days, or 1920 working hours based on an 8-hour day.

It is not possible to operate any foundry facility 100 per cent of the available working hours in the year, therefore due allowances should be made for reasonable down time, thus reducing the available hours to the actual hours the facility is expected to operate. Down time caused by lack of work or operators is not a normal factor and should not be considered in these allowances. Such allowances are in no way connected with efficiency standards established to increase the number of units produced in a specified time. It is quite possible that the percentage of down time will vary between different operations.

In determining the break-even point and the out-of-pocket line it is necessary to analyze the company's probable expenses, by cost elements, arriving at amounts applicable to the established normal hours. The sum of the costs thus obtained will be the normal costs for the period under review.

If the company produces castings of uniform size and character, it is not necessary to departmentalize the several elements of costs. Fig. 2 illustrates a method of arriving at the break-even point and the out-of-pocket line for a foundry of this type.

At the top of the chart are the several elements of cost segregated as to variable and fixed. Variable elements are those which fluctuate to a large extent with the pounds of castings produced, while the fixed elements are not influenced by production volume. However, in actual practice there may be certain expenditures in the variable class that should be treated as fixed, and vice versa. Only careful analysis of actual conditions in the individual foundry will determine what, if any, deviation from the usual classification should be made.

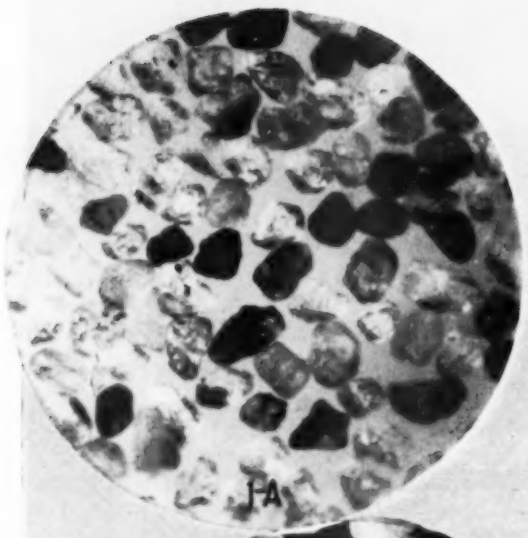
It is assumed, in this illustration, that the normal capacity of the foundry is 10,000,000 pounds of good castings. The total normal operating cost for 10,000,000 pounds of good castings is $800,000; the castings can be sold in the market at 9 cents per pound, or the normal output at $900,000.

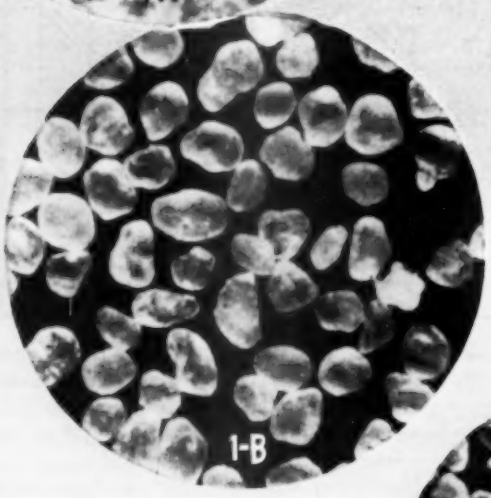
Analysis of the company's operating facilities indicates that the reductions in metal and variable costs are as shown by the horizontal lines. These reductions are caused by possible decreases in tonnage below the normal output.

As the company declines to adjust salaries and some other expenses when production falls off, the fixed expenses remain constant.

If we project a sales line, at 9 cents per pound, we find that it bisects the total cost line at 6,750,000 pounds of production. This then is the break-even point, or the number of pounds of production that would just return, in sales, the total cost of operating the business.

Projecting the sales line (*Please turn to page* 256)



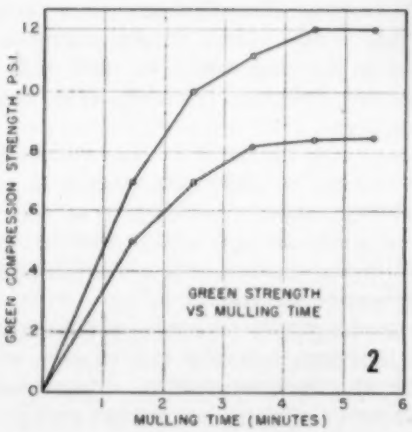



Fig. 1—Representative samples of *(A)* Colona bank sand; *(B)* Portage silica sand; *(C)* Ottawa silica sand. Magnification 20X. Sand grains passed through No. 50 sieve, retained on No. 70 sieve

Fig. 2 — Relationship between green compression strength and mulling time

# Cores

By ERIC WELANDER
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IN CONSIDERING the subject of malleable core sand practice, we should first consider the functions of cores and the properties required.

Dry sand cores are used chiefly to form internal cavities within the castings produced, or to form a portion of the outer surface of the castings.

During the production of the cores, the sand mixture must be flowable enough to assume the required shape, and must possess enough green strength to retain that shape during handling and baking. Following baking, the cores must be strong enough and hard enough to resist breakage during handling. The baked cores should possess sufficient permeability to allow escape of gases formed during the pouring of the metal, and have as smooth a surface as is required to produce the necessary casting finish. In the mold the cores must resist erosion and deformation by the molten metal, and should exhibit a minimum of contraction or expansion, and gas formation. However, as the metal solidifies, the cores must possess enough collapsibility to permit contraction of the metal without cracking.

These are the principal requirements of cores for malleable iron practice, and the method of incorporating these properties into suitable cores at a reasonable cost constitutes our major coreroom problem.

Our first consideration in acquiring these properties should be the raw materials that make up our cores. The importance of obtaining the proper sand

**TABLE I—Grain Size Distribution of Representative Core Sands**

| % Retained on Sieve No. | Colona Bank | Portage Crude | No. 60 Ottawa |
|---|---|---|---|
| 6 | .... | .... | .... |
| 12 | .... | .... | .... |
| 20 | .... | .1 | .... |
| 30 | .2 | 2.7 | .... |
| 40 | 1.0 | 9.7 | .... |
| 50 | 6.1 | 18.7 | .8 |
| 70 | 19.0 | 24.8 | 21.2 |
| 100 | 36.4 | 25.0 | 48.7 |
| 140 | 19.6 | 12.6 | 18.7 |
| 200 | 10.0 | 4.8 | 8.2 |
| 270 | 4.1 | 1.0 | 1.9 |
| Pan | 2.6 | .3 | .6 |
| Per cent AFS clay | 1.0 | .4 | .0 |
| AFS grain fineness | 88.2 | 63.0 | 80.8 |

# Sand Practice

## IN THE MALLEABLE IRON FOUNDRY

*Some of the basic fundamentals of coreroom practice which, if disregarded, can cause trouble, are discussed by the author. This paper was presented at the 12th annual Wisconsin Regional Foundry Conference, Feb. 10*

is further emphasized by the fact that, in most mechanized foundries, the core sand becomes the base for the synthetic system sand used in the foundry. Any irregularities in the core sand are transmitted to the foundry molding sand. Any major changes in molding sand characteristics that involve grain size or distribution must be made in the coreroom. In most mechanized sand systems, no additions of new sand are made, the sand addition being made in the form of cores.

In general, three types of sand are available for use in the coreroom. The first of these is the so-called "bank sand" type. Bank sands are usually sold as they occur in nature, and contain a small amount of natural clay. They are generally subangular in shape and somewhat finer in grain size than the other two groups. The second group, the crude silica sands, also includes the lake sands and the dune sands, and are more nearly round in grain shape. These contain only a trace of clay. The third group, the washed and graded silica sands, are practically pure quartz, and contain no clay. These are perhaps the roundest of the sand grains available commercially, but are not truly spherical. Fig. 1 shows representative samples of these three groups.

There is considerable disagreement among sand technicians as to which shape of sand grains is preferable. Perfectly round grains have the highest ratio of volume to surface area, yet provide the least amount of surface contact between grains. The subangular grains will pack more tightly when blown in a corebox, but will probably be somewhat more erosive than round grains. The availability and cost of the sand will probably be the deciding factor with regard to grain shape, as both round grains and subangular grains have their advantages.

The size of the sand grains is of considerably more importance than the shape of the grains. Fundamentally, it is the size of the sand grains that determines the casting finish in the foundry. Of course, other factors also affect finish, but the size and distribution of the sand grains is very important. The permeability of the core will also be determined largely by the sand fineness and distribution. The most satisfactory method of changing the permeability of the foundry system sand is by changing the distribution of the base sand used in the coreroom.

At one time, it was the common belief that an ideal sand would be one in which all the grains were of one size. We realize now that this would not be a good foundry sand. Expansion problems, together with the accompanying scabs, buckles, etc., would soon appear in the foundry if we used such a sand. More recently, the consensus among foundrymen has been that at least 50 per cent of the sand grains should be retained on three adjacent screens. This has now been modified to include five or more screen sands also. Table I shows the grain size distribution of the three sands described previously. This distribution is shown graphically in Fig. 3.

**TABLE II—Grain Distribution of Sand from 2" Diameter Cylindrical Core**

| % Retained on Sieve No. | Center | Halfway In | Outside | Cumulative on Sieve No. | Center | Halfway In | Outside |
|---|---|---|---|---|---|---|---|
| 6 | ... | ... | ... | 6 | ... | ... | ... |
| 12 | ... | ... | ... | 12 | ... | ... | ... |
| 20 | ... | .1 | ... | 20 | ... | .1 | ... |
| 30 | 1.1 | 1.5 | 1.3 | 30 | 1.1 | 1.6 | 1.3 |
| 40 | 4.3 | 5.9 | 4.5 | 40 | 5.4 | 7.5 | 5.8 |
| 50 | 10.5 | 12.8 | 11.1 | 50 | 15.9 | 20.4 | 16.9 |
| 70 | 24.2 | 27.3 | 24.4 | 70 | 40.1 | 47.7 | 41.3 |
| 100 | 34.3 | 32.4 | 33.8 | 100 | 74.4 | 80.1 | 75.1 |
| 140 | 15.0 | 12.7 | 14.7 | 140 | 89.4 | 92.8 | 89.8 |
| 200 | 6.8 | 5.1 | 6.7 | 200 | 96.2 | 97.8 | 96.6 |
| 270 | 2.3 | 1.5 | 2.2 | 270 | 98.5 | 99.3 | 98.8 |
| Pan | 1.3 | .7 | 1.2 | Pan | 99.9 | 100.0 | 99.9 |

**TABLE II—Distribution of Equal Mixture of Coarse and Fine Silica Sand**

| % Retained on Sieve No. | Coarse Silica | Fine Silica | Center of Core | Outside of Core |
|---|---|---|---|---|
| 6 | ... | ... | ... | ... |
| 12 | ... | ... | ... | ... |
| 20 | ... | ... | ... | ... |
| 30 | 4.3 | ... | 2.0 | 1.9 |
| 40 | 47.4 | ... | 25.0 | 23.5 |
| 50 | 36.4 | .8 | 17.2 | 16.5 |
| 70 | 9.5 | 21.2 | 18.9 | 20.3 |
| 100 | 2.0 | 48.7 | 23.7 | 25.1 |
| 140 | .3 | 18.7 | 9.2 | 9.0 |
| 200 | .1 | 8.2 | 2.8 | 2.8 |
| 270 | ... | 1.9 | .6 | .5 |
| Pan | ... | .6 | .3 | .2 |

The amount of fine material in the sand and the amount of clay present are also important factors in choosing the base sand. For the purpose of our consideration, let us consider any material passing through a 200-mesh sieve as fines. This material and the natural clay present are not desirable in most core sand mixes because of the comparatively large amount of oil they will absorb. It has been stated by some sand technicians that a sand containing a small amount of clay will develop its green strength more rapidly. This may be true, but the excess amount of oil needed to provide the desired bake strength must also be considered.

It is good practice to choose as fine a sand as possible to produce the best finish. However, the sand must possess sufficient permeability to properly vent the core. It should be remembered, also, that the finer the sand used, the more oil and bonding material will be required.

The choice of sand, then, must be made for the particular conditions under which the sand is to be used. Sand grain shape, grain size and distribution, amount of clay and fines present, are all important, but cost and availability of the sand must also be considered, and will probably determine the sand to be used. The reliability of the supplier should also be carefully considered. If one car of sand received is ideal according to specifications and the next car is quite different, one's troubles are multiplied. The importance of adopting rigid specifications and then carefully checking the incoming material cannot be overemphasized.

Moisture content of the sand as it goes to the sand mixer should not be overlooked. If a drier is not available, other means should be provided so that the sand is practically dry as it is mixed.

One theory has been advanced by some sand men concerning sand distribution and the effect of core blowing. It has been believed by some that in blowing sand cores, the finer grains are blown to the outside of the core and the coarser grains remain in the center. Such a condition would be ideal, because the finer sand grains would provide an excellent finish and the coarse center would provide maximum permeability. However, experiments we have conducted recently do not bear this out.

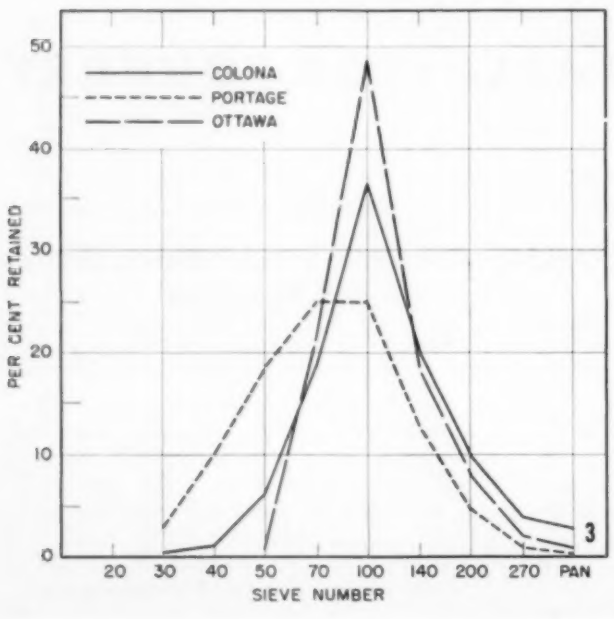
We selected a center core about 2 in. in diameter and 10 in. long, blown from one end, using the bank sand previously shown. The cores were turned down in a lathe and the sand from the outer $\frac{1}{8}$-in. was collected. A sample was also collected from the section $\frac{1}{2}$-in. below the surface, and a third sample from the center of the core. The samples were burned off in a muffle furnace to decompose the oil and cereal binder, and were then washed according to the AFS clay content determination. After the removal of the clay, the sand fineness was determined in the usual manner, with the results shown in Table II, and the same data shown graphically in Fig. 4.

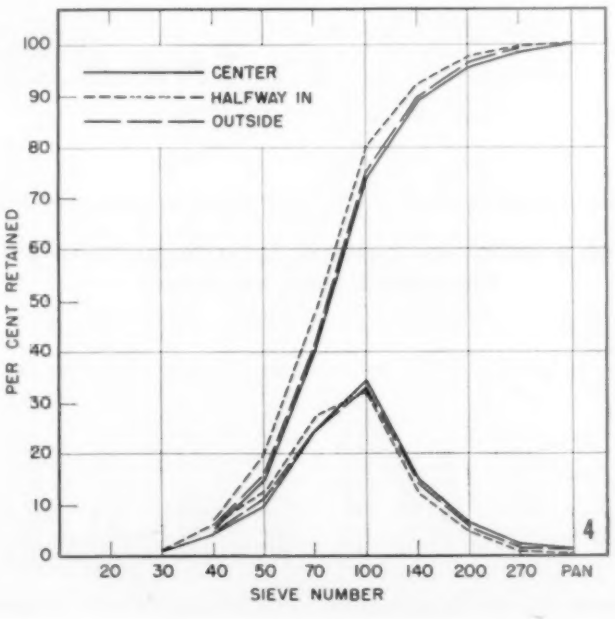
This experiment was repeated, using the crude silica sand previously listed, with similar results. It is apparent from these tests that very little segregation results during core blowing. To confirm this finding, a 50-50 mixture of coarse silica sand and fine silica sand was mixed with cereal binder and 1 per cent core oil, and blown into the same corebox used in the previous test. The fineness test of the two sands, and the resulting mixture taken from the outside and center of the core, are shown in Table III.

Green strength in core sand mixtures is usually obtained by using cereal binders. Corn flours are most commonly used. Wheat flour and rye flour were formerly used, with little success, although a vastly improved wheat flour is now becoming available. Bentonites or naturally bonded molding sands are sometimes used for obtaining (*Please turn to page* 262)

Fig. 3—Grain size distribution of core sands

Fig. 4—Grain distribution of sand from various sections of a 2-in. diameter cylindrical core



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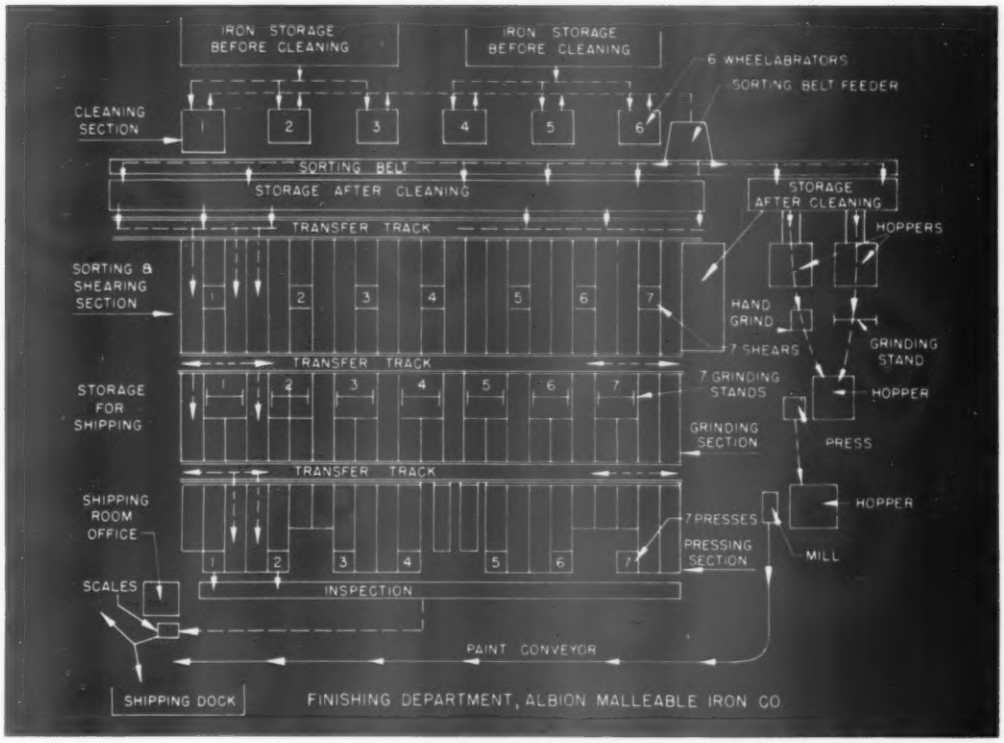


# Finishing Control

**How one company employed more efficient methods to eliminate a bottleneck in its finishing department is detailed here. This paper was presented before the Ohio Regional Conference held at Columbus, O., Mar. 11-12**

THIS discussion of steps taken by the Albion Malleable Iron Co. to improve the efficiency of its finishing department might well be preceded by a description of the general plant layout. We are a production foundry doing duplexing. The core department is completely mechanized. Castings from the four production lines are handled by conveyors to the trimming and hard iron inspection, then go to the annealing department.

After castings leave the annealing department, the first operation of the finishing department starts. Various sections of the latter department are shown in the above sketch. First step is cleaning of the iron, which then moves from the cleaning section to the sorting and shearing section. Here the castings are sorted according to part number and stored for subsequent operations. From this section the iron is handled on a roller transfer car and tote pans and moved to the shears, grinders and presses. From the presses the castings are inspected immediately and readied for shipment, moving from the inspection area to the scales and then to the shipping dock or to storage.

The foregoing handling system applies to the large section shown at the center and left of the sketch. In the right-hand section, castings are handled by hoppers and overhead belt conveyors through the various finishing operations.

About a year ago we were faced with an unbalanced condition between the foundry and the finishing department. It was found that the foundry was out-producing the finishing department by 30 per cent, and the question was what to do to modernize the latter in order to effect a balance between it and the foundry. One of the first steps was to ask the men working in the finishing department what should be done to correct this condition. The answer was that we needed two new large airless blast units, enlarged storage capacity after cleaning, three new grinding stands, two new presses, about a hundred new skids to handle the material and an increase in the working force of 10 per cent.

When top management was presented with this outline, it debated whether this additional cost and increase in manpower would do the job. Consequently, the manufacturing control department, which at that time was just starting to operate in the plant, was asked to make a study. This move was prompted by the fact one of the members of the control department told top management that if 90 per cent efficiency could be obtained in the finishing department, it would be possible—with (*Please turn to page* 248)

# Questions AND

## Investment Casting of Brass

**Q.**—Can you give us any information on the lost wax process for producing brass precision castings, and have any articles been published on the subject?

**A.**—Procedures employed for the production of brass castings by the investment molding or lost wax process are similar to those employed for other alloys except for the type of molding material. Since brass is poured at a much lower temperature than steel, for example, the molding material does not require as high refractory qualities. One manufacturer indicates that for nonferrous alloys the investment material is composed of quartz, tridymite and cristobalite bonded with calcium sulphate, while for ferrous alloys the material is composed of quartz and tridymite bonded with acid phosphate and fused metallic oxides.

With nonferrous alloys the precoat method, that of dipping or spraying the wax pattern with finely divided silica, usually is not employed. The pattern is placed in a flask, and the investment material poured over it. Next the flasks are placed under a bell jar and evacuated to remove any entrained air in the mixture. This insures removal of any air bubbles at the interface between pattern and investment.

After a suitable drying period the flasks and pattern are placed in a furnace to melt out the wax, and then raised to a high temperature to burn out wax which might remain in any small crevices. Mold may be cooled somewhat, and then is filled with molten metal. For description of various details of the operations we suggest that you study "Precision Investment Casting at International Nickel Co." by R. H. Herrmann which appeared in the September, 1948 issue, and "Large Scale Production of Small Intricate Castings' by R. H. Herrmann which was published in the February, 1949 issue of THE FOUNDRY.

## Embrittlement of Malleable

**Q.**—Operating a malleable foundry in France we produce caps for suspension insulators, hardware, and other accessories for high tension equipment. These are galvanized and we have noticed that some of these castings give premature breakage. We suppose that the galvanizing causes a molecular transformation, and perhaps a dispersion of zinc in the first coating of the body. Do you know of some technical articles or books which treat with this condition, or have you personal information which you could transmit to us?

**A.**—When malleable iron castings are heated to about 850 to 900°F (454 to 482°C) as in the hot-dip galvanizing process they may be affected by intergranular embrittlement due to heating and quenching. In 1922-23 Bean investigated this problem and found from laboratory work that the Si-P relationship appeared to have an important effect on whether or not embrittlement occurred at the temperatures involved in hot-dip galvanizing of malleable. From the laboratory the work was taken into the plant, and under operating conditions it was found that the laboratory data were confirmed. As a result Bean was able to construct a curve based on a large number of heats which showed the demarcation between embrittling and non-embrittling Si-P relationships. The formula for the curve is $\%P = \frac{2.125 - \%Si}{6.25}$ which indicates that as phosphorus increases, the silicon must be decreased.

About the same time Marshall found that a heat treatment at 1200°F (649°C) previous to galvanizing eliminated trouble from embrittlement. Procedure is to heat the castings at 1200°F for a few minutes, and then quench in hot water at 175°F (79°C). Following that treatment the castings are hot-dip galvanized in the usual manner.

## Making Gate and Globe Valves

**Q.**—Can you tell us whether the method of producing brass gate and globe valve castings by use of matchplates is cheaper than by use of split pattern molding?

**A.**—Answer to your question on which is the cheaper molding method for producing gate and globe valve castings involves considerably more than meets the eye at first glance. If you are referring to the procedure which will give the largest production, our guess would be the split pattern—cope and drag method, involving two molding machines and operators. That guess is based upon the fact that less fatigue and number of operations are involved as compared to a double-face matchplate method.

In the latter the operator has to place the cope flask on the machine, locate the matchplate, and then place the drag flask. He then rams the drag flask, rolls the whole over, and rams the cope. The cope is lifted off and set aside, the matchplate removed and set up on the machine. Cores are placed in the drag, the cope put on, and then the whole mold is carried from the machine to be set out for pouring.

With cope and drag molding the pattern is fixed to the machine platen or table, and the operator has only one flask to put in position, as well as only one half-mold to remove from the machine. However,

# ANSWERS

the only way to determine definitely the true facts is to obtain figures from foundries which employ the particular methods—with data on auxiliary equipment included with each. The latter may mean quite a lot in the production.

## Core Gives Trouble in Bushing

**Q.**—We are having trouble making a bushing 9½ in. OD, 4½ in. ID and 14 in. long in the 80 per cent Cu, 10 per cent Sn and 10 per cent Pb alloy. Our trouble seems to be that the core is not strong enough and the metal burns in, causing a very difficult cleaning operation. We are using lake sand, 55 AFS grain fineness, with core oil in the ratio of 50:1. We have sectioned one of the bushings and find the surface next to the cores full of holes. Pouring temperature is 1950°F, and casting, poured vertically, is step-gated at bottom, 7 in. from bottom and near the top which forms a 4-in. high riser. A 1-in. vent through the top carries off gas from the core.

**A.**—High-lead bronzes have a tendency to penetrate both mold and core, and usual practice is to employ a graphite or other protective coating to prevent that action as much as possible. That searching quality is aggravated by use of too much phosphor-copper in deoxidation, as well as excess temperature. Hence, we suggest that you look into those phases, using the minimum in both. However, the holes around the core result from the gas not escaping freely. While you mention a 1-in. vent from the core, we believe that a core 4½ in. in diam should have a vent at least that diameter all the way through, and vented to the outside top and bottom. Possibly the core may not be baked thoroughly, and it generates considerable gas.

Have you ever tried pouring these bushings through a ring of pop gates at the top? We believe that it can be made that way, and will save considerable time and effort as compared to the method you mention of step gating, or even bottom gating.

## White Coating Shows on Brass

**Q.**—In making brass castings we have run into a white granular substance that usually is near the surface of the casting so that we have to make our stock about ⅛-in. oversize to machine it off. We use an oil-fired crucible furnace with a home-made burner with which we can take down a 250-lb heat in an hour with a hot furnace. We have checked every possibility we can think of which might cause the trouble. At present the flame of the furnace is running about half way between a complete green and a complete white which is giving us our best results, although we have tried it with varying amounts of white. We have used varying amounts of phosphor copper as well as none at all, but no change in results. We have been careful with molding and pouring practices. The only place which we can think of giving the trouble is the burner, but we used it in another shop last year with good success.

**A.**—Without a specimen to examine, it is rather difficult to determine just what the coating is, but we suspect that your raw material is contaminated with silicon. You probably are using some purchased scrap which may contain silicon bronze or brass. The silicon combines with the lead in your brass to form a lead silicate. From your description of the coating, the amount of silicon picked up must be quite high, and indicates the possible inclusion of silicon bronze or brass in the mix. Best method of ascertaining exactly the composition of the coating is to send some of the turnings removed in machining to a laboratory, and have them analyzed.

You undoubtedly can eliminate the trouble in the meantime by eliminating the use of scrap in your mixture—just employ ingot of the desired composition. Then, of course, if you want to use scrap, you will have to examine carefully the material on hand and segregate the silicon bearing material. Possibly you might be able to employ the nitroprusside test to give some idea of what might be silicon bronze. The only trouble with the test is that copper and cupro-nickel also show the same reaction. However, it is claimed that the test will distinguish those three from gun metal, the brasses, aluminum and manganese bronze, etc.

Solutions used are a 5 per cent aqueous solution of sodium nitroprusside, and hydrogen peroxide (5

## GANGWAY! By J. A. PATTERSON

"Hello there, Bub—I'm lookin' for a soft job here to pick up a few bucks—maybe you could tell me where to go?"

volumes of 20 volume peroxide diluted to 100 volumes with distilled water). Procedure is to place some drillings or turnings in a test tube. Cover with the sodium nitroprusside solution, and heat over the bunsen flame. Boil for one or two minutes. Take from flame and after a few seconds decant the liquid. Then add a little of the hydrogen peroxide solution. Surface of silicon bronze, copper and cupro-nickel will turn blue while the other nonferrous alloys will not be affected.

## Castings Exhibit Poor Surface

**Q.**—We have a foundry problem which has prevailed for some time, and which we have not been able to overcome. To aid in offering possible suggestions we are sending you a casting as it comes from the sand, and a similar one after polishing, buffing and chromium plating. You will note that the finished piece shows a porous or pitted condition. This defect appears most frequently on the top of the castings, but many times also appears on the sides. Molding sand used is No. 0 Albany strengthened with southern and western bentonite, and shows a permeability of 15, green compression strength of 5 psi, dry compression strength of 30 psi, and 6 per cent moisture. Castings are molded in 12 x 18-in. flasks, 4½-in. drag, 5-in. cope with 85 to 90 psi squeeze. All of the casting is in the cope with the exception of the two posts. There are three vents; one for each opening in the top of the casting.

**A.**—Study of the rough and finished castings as to surface appearance and by fracturing leads to the opinion that your troubles result essentially from dross or dirt being carried into the mold, and from use of too coarse a sand. Examination of fractured sections, both in heavy and light portions, under the magnifying glass did not reveal any of the fine holes indicative of gas absorption. We also filed down a small area on the rough casting until it was smooth and then polished with 360 grit silicon carbide paper to simulate the polishing operation. While to the naked eye the appearance was good, under the magnifying glass many of the pits still showed up. Presumably, if the filing down operation was carried a little further, the pits would have been removed since they were quite small. Hence, we believe that if more metal is taken off in the polishing operation, possibly by using a coarser grit wheel and following with those now in use, you can salvage many of the castings.

While you state that you are using a No. 0 Albany sand, the surface appearance of the rough casting, which might be termed medium smooth, seems to indicate that the sand is about a grade coarser. This is borne out through use of a formula developed by Dietert in Transactions, AFS, 1937 which states that

$$P = \frac{3.5}{C} S \left( \frac{714}{M + 3} \right)^2$$

where P is permeability, C is green compressive strength, M is grain fineness number and S a constant, is 1.0 for nonferrous sands. Substituting your values for permeability and green strength the formula becomes

$$15 = \frac{3.5}{5} 1 \left( \frac{714}{M + 3} \right)^2$$

and M is equal to 151.3 grain size or around No. 1 Albany.

In castings which are polished and plated it is essential to obtain as smooth a surface as possible to keep the polishing to a minimum from the cost standpoint. Hence, it is worthwhile to use the finest sand that can be employed without running into trouble from surface blows. Therefore, we suggest that you experiment with finer sands until you find a combination which will meet the previously mentioned requirements. Possibly with your present sand you might get a smoother surface by using flour. As far as dirt and dross are concerned, see that the sharp edges of the mold joint do not break off, that the mold is blown out to remove any loose particles of sand, and that the metal is skimmed carefully. Breakage of mold edges may be due to the bond content being too low, a sand not mixed well, or sand being worked on the dry side. Dross entering the mold may be prevented by floating a hardwood block at the lip of the crucible, and by use of perforated skimmer core gates where the sprue enters the runner.

## Hardenable Type of Gray Iron

**Q.**—In our foundry located in India we make castings for sewing machines, and would appreciate information on very light castings to withstand wear which can be hardened and ground after machining operations.

**A.**—Your inquiry on light sewing machine castings which are to be hardened and ground is somewhat indefinite since it gives no information on section thickness, shape, etc., which would give some idea on whether the quenching operation could be conducted in oil, in air, or in some other medium. Usually alloying agents are added to cast iron to decrease the rate of transformation from one structural constituent to the other as well as to provide more concordant end results.

You undoubtedly will have to do some experimental work to obtain the desired results as to the most suitable alloying combination as well as heat treatment, quenching and drawing or tempering operations. Hurst, for example, indicates the following composition for piston rings which might compare to your light section castings, containing 2.10 per cent Si, 3.40 per cent TC, 3.25 to 3.50 per cent Ni and 0.55 to 0.65 per cent Cr, quenched in air, and drawn at 500°F showed a brinell hardness number around 390. The material as cast had a brinell hardness of about 255. Other possibilities include 2.75 per cent Si, 3.25 per cent TC, 0.95 per cent Mo, and 1.30 per cent Ni; 2.70 per cent Si, 3.70 per cent TC, 0.20 per cent Cr, and 0.20 per cent Mo; 1.65 per cent Si, 3.65 per cent

(*Concluded on page* 128)

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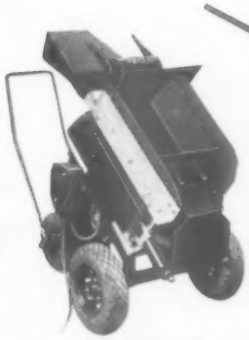

Model N8-4
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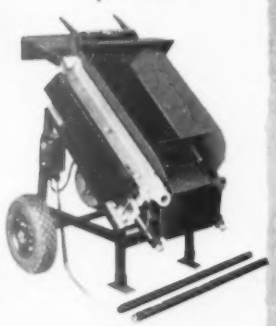
per hour



Model NC-2
12 to 15 tons
per hour

Model NDP
20 to 25 tons
per hour

Model NRS
40 to 50 tons
per hour

Model NDC
Combination
20 to 25 tons
per hour

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Combination
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per hour

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159 PRINGLE ST., KINGSTON, PA.

# Questions AND ANSWERS

(*Concluded from page* 126)

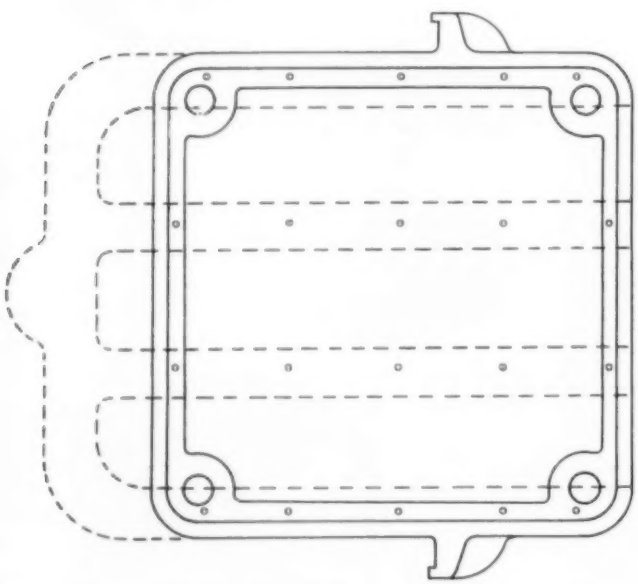
TC, 0.40 per cent Cr., 0.40 per cent Mo, and 1 per cent Ni.

Other variations of heat treatment and quenching include flame hardening and isothermal quenching. The latter involves heating to the desired temperature, quenching in a liquid bath held at 400 to 800°F, holding in the bath long enough to attain the desired properties, and then cooling.

## Gating of Large Filter Plate

**Q.**—We will appreciate your recommendation on gating and risering the frame shown in the accompanying drawing. Frame is made of ASTM No. 30 or 40 gray cast iron in green sand molds of naturally bonded sand. When the thickness of the central portion and outer edges are ½ and 1½ in. thick respectively, we often encounter shrink hollows on the surface of the cope side. Since this surface must be machined, such castings are no good.

**A.**—In our opinion the most suitable method of gating the frame is by placing a series of pop or top gates in four rows equally spaced as indicated in the drawing. Rows of gates are placed over two of the outer, heavy sections, and the others equally spaced



Suggested procedure for gating a large filter plate to promote better feeding and eliminate shrinks

between them on the thinner central section. A green sand pouring basin will have to be made to join the channels or branch runners from which the pop gates drop to a single cross channel or main runner into which the metal is poured from the ladle. Diameter of the gates may be ⅜ to ½-in., or possibly ¼-in.; the most satisfactory being established by experiment.

To enable the metal pourer to determine when the mold is filled, a small riser or tell-tale should be placed at one corner. After a little experience he can judge the pouring so that comparatively little metal remains in the runners after solidification of the casting. If you want to eliminate any possibility of loose sand, dirt, etc., entering the mold cavity, small tins can be placed over each of the gates. These will remain solid sufficiently long to permit the molten metal to fill the runners, floating the light material on the surface, and allowing only clean metal to drop into the mold cavity.

## Gas Absorption Causes Trouble

**Q.**—We occasionally cast high-lead tin bronzes and have difficulty in the tin and lead separating out in the castings. We are using all scrap which is carefully graded, and the metal is melted in an oil-fired crucible furnace in which we try to maintain a neutral atmospheric condition. Metal is removed as soon as it is up to pouring temperature, and is covered with charcoal during melting. It appears from the casting that the tin is squeezed out as the casting cools and forms large deposits in the space left in the mold as the casting contracts. As we recall, we used to employ some type of flux just before the metal was poured which kept the tin and lead in solution.

**A.**—While we cannot be positive about the matter, we suspect that your trouble with exudations of tin on the surface of the high-lead bronzes is due to absorption of gases during melting. You mention that you try to control the flame to get a neutral condition in the furnace, but that is rather difficult without use of some type of gas analysis equipment. We believe that you will get better results by having a slightly oxidizing flame; that is, one that is sharp and greenish as opposed to one that is soft and yellowish or slightly smoky. Also we believe you are defeating your purpose by covering the metal with charcoal since it creates a reducing atmosphere, and if it happens that the charcoal is moist, it will result in the metal absorbing water vapor.

Many foundrymen produce those alloys without any cover flux, and others use a variety of materials including proprietary fluxes. Old timers claimed that the use of 4 oz per 100 lb of metal of a mixture composed of 25 per cent sodium sulphate, 45 per cent plaster of paris, 20 per cent sodium chloride, and 10 per cent calcined borax, or the same amount of barium sulphate, worked wonders in keeping lead in solution in high-lead bronzes.

Perhaps you are adding too much phosphor-copper in the belief that the alloy is over-oxidized during melting. Not more than 2 oz of that material should be used. You probably will find that the addition of 2 oz per 100 lb of metal of copper oxide or lead oxide will be much more effective in eliminating the so-called oxidized condition, since the trouble is due to the absorption of reducing gases such as hydrogen. However, rather than depend upon the addition of oxidizing agents, it is much sounder practice to look into melting conditions, and see that they are such that the furnace atmosphere is slightly oxidizing rather than reducing.

# Suppose your foundry employed less than 100 . . .

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- unloading scrap, rails and pig iron.
- loading charging cars, hoppers and buckets.
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- moving bulky castings in cleaning dept.
- picking up sprues, gates, runners, overflow.

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# Men OF INDUSTRY

**JOHN P. AHERN** has been named executive director, National Foundry Association, Chicago, and **Edward E. Fries,** field secretary. Mr. Ahern was graduated from Yale University in 1931 and spent 10 years in the insurance business. For the last 7 years he has been on the executive staff of the Manufacturers Association of Connecticut Inc., Hartford, Conn. He will direct promotional activities and expand the services of the National Foundry Association under direction of **L. E. Roark,** executive vice president. Mr. Fries, who has been on the administrative staff of the association for several years, will devote his time to development of foundry management activities in the nine regional districts of the organization.

♦ ♦ ♦

**James E. Ziegler** has joined the sales engineering staff of the Cooper Alloy Foundry Co., Hillside, N. J., to provide increased technical service to the Pittsburgh - Cleveland - Detroit areas, with headquarters in Cleveland. Mr. Ziegler, a graduate of the School of Metallurgical Engineering, Purdue University, recently completed the extensive in-service training course at Cooper Alloy Foundry Co.

♦ ♦ ♦

**Norman F. Tisdale,** since 1933 chief metallurgical engineer, Molybdenum Corp. of America, Pittsburgh, has been appointed manager of sales. Mr. Tisdale was born in Canada and was graduated from Queen's University, Kingston, Ont. He joined Molybdenum Corp. of America in 1934, having been associated previously with Titanium Alloy Mfg. Co. and Republic Steel Corp., at Buffalo. Mr. Tisdale is active in various technical societies.

♦ ♦ ♦

**A. W. Gregg,** consulting engineer, Whiting Corp., Harvey, Ill., **Fred B. Skeates,** foundry superintendent, Link-Belt Co., Chicago, and **Chester V. Nass,** vice president, Pettibone Mulliken Corp., Chicago, recently were appointed by the Chicago Chapter, American Foundrymen's Society, to function as an advisory committee to the foundry practice and pattern design course of the Chicago Undergraduate Division, University of Illinois, Navy Pier, Chicago. Mr. Gregg is chairman of the group. The committee has held several meetings with **R. P. Hoelscher,** associate dean of engineering science, and members of the instructional staff, including **Robert E. Kennedy, Roy W. Schroeder** and **Glenn E. Cramer.**

♦ ♦ ♦

**William S. Loose,** formerly director of the laboratory development section of the magnesium laboratory, the Dow Chemical Co., Midland, Mich., has been appointed magnesium division sales manager, responsible for all magnesium selling activities including technical service and development. Mr. Loose joined Dow in 1927, and following graduation from Michigan State College he returned to the company where he has been continuously associated with magnesium operations, in both sales and production. **Dr. George H. Found** has been named manager of technical service and development, which combines product development and technical service departments. Present product sales managers for the Magnesium Division include: **J. C. H. Stearns,** ingot, alloy and flux; **G. W. DeKuyper,** wrought products; **T. H. Caldwell,** die castings; **A. J. Smith Jr.,** anodes; **H. W. Dove,** sand and permanent mold castings; and **C. E. Lenhardt,** fabrication.

♦ ♦ ♦

**H. P. Erbe,** formerly manager of the Cleveland district sales office, the Carborundum Co., Niagara Falls, N. Y., has been named manager of the Pittsburgh district sales office, succeeding **F. H. Appenrodt,** who has resigned. **R. L. Heimstadt,** who has been assistant office manager of the Detroit district sales office, has been promoted to the position of Cleveland district sales office manager, succeeding Mr. Erbe. **D. S. Masson,** previously manager, sales administration, in the home office at Niagara Falls, becomes assistant to **J. F. Calydon,** Detroit district sales manager. **J. R. Middleton** continues as office manager there.

♦ ♦ ♦

**Augustus H. Elliot,** vice president, Southern Wheel Division, American Brake Shoe Co., New York, has retired following 40 years of service with the company. A graduate of Yale University, Mr. Elliot served American Brake Shoe Co. for nearly 18 years in various sales and engineering capacities in Philadelphia and New York. He became a vice president of Southern Wheel Division in 1927, and had charge of engineer-

(*Continued on page* 132)

EDWARD E. FRIES

JOHN P. AHERN

JAMES E. ZIEGLER

NORMAN F. TISDALE

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Frederic B. Stevens, Inc.
New Haven 11, Conn.
Western Industrial Supply Co.
Portland 14, Ore.

# Men OF INDUSTRY

(*Continued from page* 130)

ing and operations for many years. He established the company's wheel inspection department, which was later taken over by the Association of Manufacturers of Chilled Car Wheels, and he has been active in development of the present chilled freight car wheel.

♦ ♦ ♦

**Stanley M. Hunter** has been elected to the newly created position of executive vice president, American Hoist & Derrick Co., St. Paul. Mr. Hunter was graduated from Albion College and joined Novo Engine Co., Lansing, Mich., as an apprentice in 1919, serving as sales manager there from 1925 to 1936. He entered the sales department of American Hoist at that time and has served as vice president in charge of sales and a member of the board of directors since 1945.

♦ ♦ ♦

**Frank Weir** has been appointed Pittsburgh district sales manager, Harbison-Walker Refractories Co., Pittsburgh. Mr. Weir joined the Pittsburgh sales department of the company in 1923 and has since been connected with the New York, Boston and Buffalo sales offices. He has been St. Louis district sales manager for the past 3 years. **George D. Cobaugh** succeeds Mr. Weir there as district sales manager. Mr. Cobaugh became associated with the company in 1928, and in 1936 was transferred to the St. Louis sales office. For the past 10 years he has been with the Birmingham sales office with headquarters in New Orleans.

♦ ♦ ♦

**Howard B. Voorhees** has been appointed manufacturers' agent, Topsall Lubricants Inc., Kenmore, N. Y., and United Oil Mfg. Co., Erie, Pa., with headquarters in Mishawaka, Ind., and will handle distribution of greases, cutting and core oils in that district for the two companies. Mr. Voorhees, until recently was associated with Peru Foundry Co., Peru, Ind. An active member of Michiana Chapter of the American Foundrymen's Society, he served as its chairman last year and is one of its directors for the current year.

♦ ♦ ♦

**Ward Dougherty,** export manager of the Machine Division, the Osborn Mfg. Co., Cleveland, left for Europe Apr. 2, where he plans to spend three months in a market survey for the company's foundry machinery products. Mr. Dougherty will visit France, Italy, Belgium, the Netherlands, England and western Germany.

♦ ♦ ♦

**Robert E. Rielly** has joined the Chas. Taylor Sons Co., Cincinnati, manufacturer of high-temperature refractories, as assistant to Robert W. Knauft, vice president in charge of sales. Mr. Rielly will assist in supervision of the company's national advertising program in addition to his sales duties.

♦ ♦ ♦

**I. N. Kimsey** has been named field sales manager of the industrial products sales department, the B. F. Goodrich Co., Akron, O. **John M. Cooney,** who for the past 2 years has been industrial products sales manager of the Boston district, succeeds Mr. Kimsey as manager of the Akron district. Mr. Kimsey joined the company as a salesman in 1922, and has been Akron district manager for the past 10 years.

♦ ♦ ♦

**Harold S. Dunn** has been appointed general sales manager, Harbison-Walker Refractories Co., Pittsburgh. Mr. Dunn was graduated from Ohio Wesleyan University, where he remained as an instructor in the School of Business Administration until 1925. He joined the Portsmouth, O., works of Harbison-Walker at that time, became district sales representative there the following year, and was appointed Portsmouth district sales manager in 1932. He has been sales manager of the Pittsburgh district since August.

♦ ♦ ♦

**William J. Grede,** president, Grede Foundries Inc., Milwaukee, was one of those honored with a distinguished service citation by the College of Engineering, University of Wisconsin, at the Engineers' Centennial Day Dinner, Mar. 15. The university is celebrating its centennial this year and conferred the citations upon alumni and industrialists of the state who have rendered distinguished service in industrial fields and civic life. Mr. Grede attended the university for two years.

♦ ♦ ♦

**Bruce L. Wilson** has been appointed chief of the engineering mechanics section, National Bureau of Standards, where he will direct research on structural elements and metal structures to determine their strength, deformation under load, and other mechanical properties and will correlate results with the theory of elastic and inelastic behavior of materials.

♦ ♦ ♦

**Willis H. Taylor** has been elected chairman of the trustees of Stevens Institute of Technology, Hoboken, N. J., succeeding **Robert C. Stanley,** International Nickel Co., who has resigned following 12 years of service. Mr. Taylor is a member of the New York law firm of Pennie, Edmonds, Morton, and Barrows.

♦ ♦ ♦

**Robert Logie** has been elected executive vice president, National Roll & Foundry Co., Avonmore, Pa., and will continue as treasurer. **Frank**

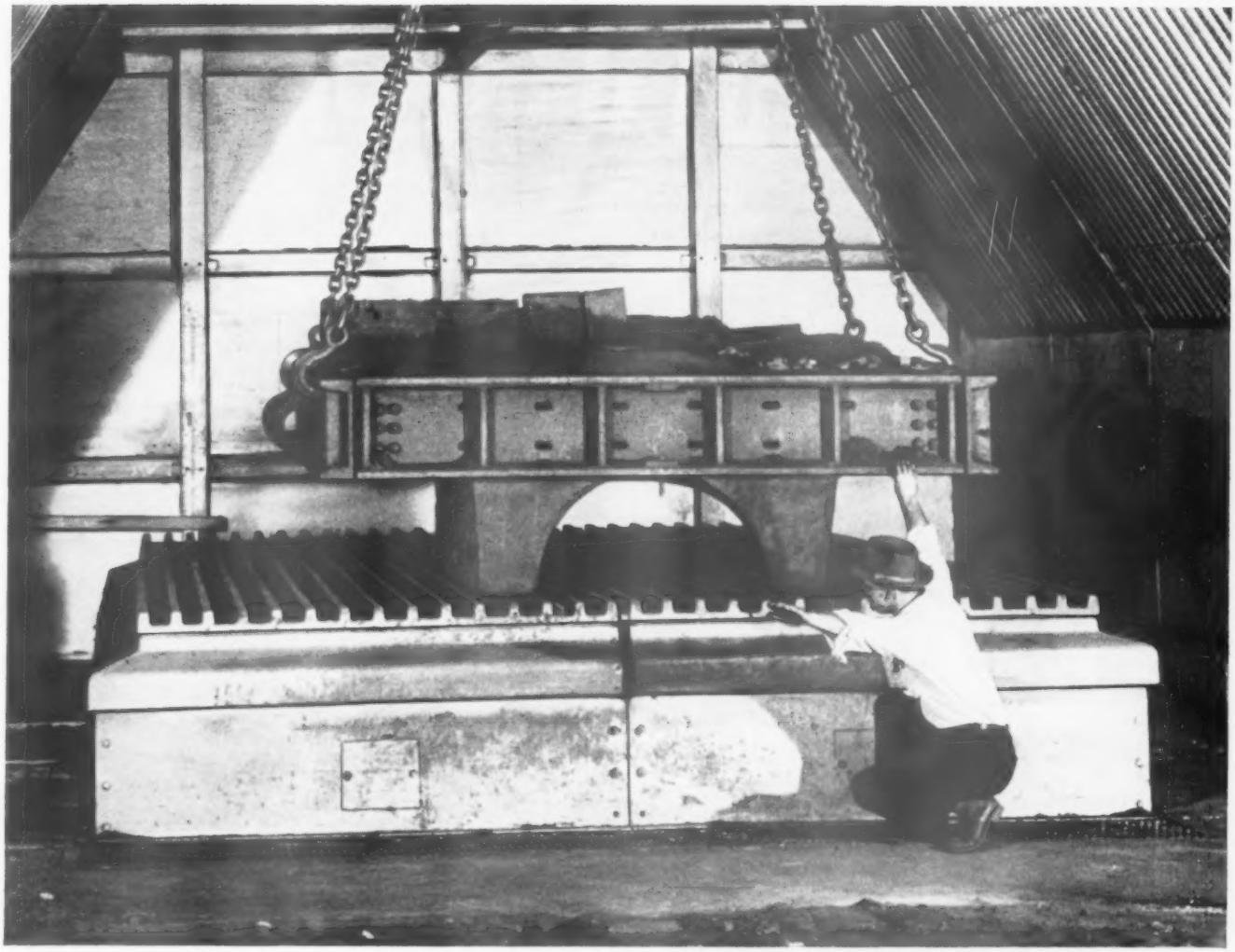
(*Continued on page* 136)

STANLEY M. HUNTER

GEORGE D. COBAUGH

FRANK WEIR

HOWARD B. VOORHEES



# Giant capacity . . . lightning speed!

## . . . yet gentle as a lamb with your flasks and castings

This Robins Floatex Shakeout can handle your really big jobs.

It can shake out your flasks in minutes—even seconds.

And it can do so *without damage to your castings!*

Yes, it's big . . . it's fast . . . and it's gentle. And it does its job by *shaking the flask—not the building!* It holds its vibration completely within its own live frame . . . where it is needed. Vibration can't escape to weaken building structures, to collapse unpoured molds, to get on your workmen's nerves.

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**1. *Cast-steel Deck.*** Proved in five years of severe service without a single skid bar being broken or damaged!

**2. *Completely Live Deck.*** Every inch of the Floatex deck vibrates . . . every inch *works.*

**3. *Self-screening Deck.*** Aids in screening out rods, gaggers, etc.—saves your conditioning equipment.

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gives you

**SAVES $5,290 A YEAR**

## Cutting Costs Like This Makes it *Easier to Compete*

A case study at LAYNE & BOWLER, Inc., Memphis, Tenn., manufacturers of pumps and water well systems. (Gray iron and bronze castings weighing from 1 to 1100 pounds each.)

| FORMER METHOD | WHEELABRATOR METHOD |
|---|---|
| **EQUIPMENT**<br>1 Airblast Room<br>2 Tumbling Mills | **EQUIPMENT**<br>72" Wheelabrator Swing Table |
| **PRODUCTION**<br>6 tons in 9½ hours | **PRODUCTION**<br>6 tons in less than 4 hours |
| **LABOR**<br>28½ man hours | **LABOR**<br>12 man hours |
| **CLEANING COST**<br>$9.25 per ton | **CLEANING COST**<br>$4.90 per ton |

**SAVINGS**

**Savings per ton—$4.35**

**Savings per year—$5290.00**
(1400 tons)

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST

# LOWER COSTS, CLEANER CASTINGS

## and other competitive advantages

Dollars saved are dollars earned . . . they help you to reduce unit costs, to increase profits, and to compete more favorably for business. And that is exactly what the savings effected by "Wheelabrating" are doing for nearly 5,000 users. To assist in proving this to your own satisfaction we offer you without obligation: (1) a cleaning demonstration; (2) a competent analysis of your cleaning problems; (3) Booklet 74-A, "The Wheelabrator . . . what it is and what it will do". You are welcome to all three.

### These Savings Are Like *Money in the Bank*

A case study at CRUCIBLE STEEL CASTING CO., Cleveland, a jobbing foundry producing castings weighing from 1 to 450 pounds each.

**FORMER METHOD**

**EQUIPMENT**
Airblast Room

**PRODUCTION**
30 tons green castings in 16 hours

**LABOR**
32 man hours

**CLEANING COST**
$3.36 per ton

**WHEELABRATOR METHOD**

**EQUIPMENT**
48"x42" Wheelabrator Tumblast

**PRODUCTION**
50 tons (30 tons green and 20 tons annealed) castings in 8 hours

**LABOR**
16 man hours

**CLEANING COST**
$2.68 per ton

**SAVINGS**

**Savings per ton—$0.68**
**Savings per day—$34.00**
(50 tons)
**Savings per year—$8500.00**
(250 days)

American

WHEELABRATOR & EQUIPMENT CORP.
505 S. Byrkit St., Mishawaka 2, Indiana

AST EQUIPMENT

# Men OF INDUSTRY

(*Continued from page* 132)

**C. Nash** has been named secretary, and **Nolan P. Benner Jr.** assistant secretary. **W. H. Seaman** continues as president and chairman of the board of directors which also includes Mr. Logie, Mr. Nash, **Reynold E. Klages, Robert V. H. Harned** and **Leland E. Smith.**

♦ ♦ ♦

**D. G. Willmot** has been appointed president, Anthes-Imperial Ltd., St. Catharines, Ont., Canada. A member of the board of directors for several years, Mr. Willmot joined the company actively as eastern manager in 1948. Prior to that time he was associated with Atlas Steels Ltd., Welland, Ont.

♦ ♦ ♦

**Dr. Carl F. Prutton** has been appointed vice president-director of operations, and in charge of research, of all of the plants of Mathieson Chemical Corp., New York, with headquarters at the New York offices. **Arthur T. Bennett,** vice president, has been placed in charge of the plants recently acquired from Southern Acid & Sulphur Co., with headquarters in Houston, Tex. **R. B. Worthy** and **J. F. Newell** have been named vice presidents. Mr. Worthy will be in charge of the plants acquired from Standard Wholesale Phosphate & Acid Works as well as the Saltville, Va., plant, of which he has been manager. Mr. Newell will remain at Lake Charles, La., where he has been in charge of the alkali and ammonia plants.

♦ ♦ ♦

**Dr. R. T. Maneely,** president of the Hoffman Bronze & Aluminum Casting Co. of Cleveland, recently was elected chairman of the Cleveland chapter of the Non-Ferrous Founders' Society. Dr. Maneely was associated with the foundry division of Apex Electrical Mfg. Co., Cleveland, for 19 years prior to joining the Hoffman organization eight years ago.

♦ ♦ ♦

**Ernest Enquist** is president, Berlin Foundry Inc., Berlin, Conn., recently organized for production of

ERNEST ENQUIST

aluminum and bronze castings. Mr. Enquist, who has spent over 44 years in the foundry industry, formerly was associated with Malleable Iron Fittings Co., Branford, Conn., and Connecticut Foundry Co., Rocky Hill, Conn.

♦ ♦ ♦

**L. G. Jessup** has been appointed sales engineer and foundry advisor, Western Metal Co., Chicago. Mr. Jessop was formerly associated with the Whiting, Ind., plant of Federated Metals Division, American Smelting & Refining Co., New York. He has had a wide experience in the metallurgical field and foundry industry.

♦ ♦ ♦

**Edward X. Tuttle,** director of foreign operations, Giffels & Vallet Inc., Detroit, left Apr. 15, from San Francisco, on an air trip to the Orient and Europe to survey problems of industrialization and reconstruction. Mr. Tuttle plans to visit Tokyo, Calcutta, Israel, Istanbul, and then on to Europe to investigate current industrial conditions in cities on the continent, returning to New York about June 20. A graduate of the College of Architecture, University of Michigan, he engaged in private practice until 1940, when he joined Giffels & Vallet.

♦ ♦ ♦

**Miles K. Smith** has been appointed vice president and technical director, Jessop Steel Co., Washington, Pa. Mr. Smith formerly was associated with Molybdenum Corp. of America, Pittsburgh, in a technical sales capacity and prior to that with Latrobe Electric Steel Co., Latrobe, Pa., in production of tool steels.

♦ ♦ ♦

**B. I. Whiting,** until recently chief engineer, Woodmanse Mfg. Co., Freeport, Ill., has resigned that position to establish his own consulting engineering practice there. Mr. Whiting is a director of the Northern Illinois-Southern Wisconsin Chapter of the American Foundrymen's Society.

♦ ♦ ♦

**Richard H. Koehler** has been appointed advertising manager, Stearns Magnetic Mfg. Co., Milwaukee, succeeding **Hugh Sharp,** who has been appointed account executive, Advertising & Publicity Associates, Milwaukee. Mr. Koehler was formerly advertising manager, Vincent-McCall Co., Kenosha, Wis.

♦ ♦ ♦

**W. B. Osgood** has been named a partner in the Dunbar Engineering Co., New York, representing Edward Valves Inc., East Chicago, Ind.

♦ ♦ ♦

**James H. Rickey Jr.** has been appointed production manager, the Ironton Fire Brick Co., Ironton, O. **W. Carl Elswick** has been named purchasing agent.

♦ ♦ ♦

**Joseph A. Marland,** formerly Chicago territory sales manager, W. A. Jones Foundry & Machine Co., Chicago, has been made sales manager.

(*Concluded on page* 138)

D. G. WILLMOT

ARTHUR T. BENNETT

DR. CARL F. PRUTTON

DR. R. T. MANEELY

Include SPO MOLDING MACHINES *in your foundry Plans...*

**. . . to receive the *Highest Return on Your Investment!***

The SPO No. 3102 Molding Machine, designed with the jobbing foundry in mind, includes our exclusive inverted jolt feature.

| | |
|---|---|
| Jolt capacity | 3000 lbs. |
| Table size | 36" x 51". |
| Pattern draw | 12". |

You make a wise investment when you buy SPO molding machines, because each SPO machine embodies exclusive and thoroughly tested design features. A rugged type of construction is your assurance of molding equipment with dependable, long life. SPO's exclusive inverted jolt feature insures long and uninterrupted production. Inquire about SPO's line of molding machines, because your needs will be met exactly and your purchase of molding machines will pay a cumulative interest.

MEMBER

*Always find out first what SPO has to offer.*

SPO INCORPORATED

*Manufacturers and Specialists in Molding Machines, Vibrators and Patterns for Production*

7500 GRAND DIVISION AVENUE • • CLEVELAND 5, OHIO

# Men OF INDUSTRY

(*Concluded from page* 136)

**Thomas A. Jones,** secretary and personnel manager, has been named assistant sales manager and will continue as secretary. **Joseph A. Guyer,** who has been handling work in the sales and advertising departments, has been made advertising manager.

♦ ♦ ♦

**Calvin E. Mettee** has joined Richmond Radiator Corp., Monaca, Pa., and **Richard McCormack** has become associated with the General Foundry & Mfg. Co., Flint, Mich. Both were students in the Department of Industrial Engineering, Ohio State University, prior to graduation in December.

♦ ♦ ♦

**Charles A. Mabey,** formerly director of research, the Bristol Co., Waterbury, Conn., has been appointed to the staff of National Bureau of Standards as assistant chief of the engineering electronics laboratory, where he will supervise electronic miniaturization, circuits and processing.

♦ ♦ ♦

**James D. Russel** has been advanced to sales manager, and **Leonard R. Shorek** to chief engineer, Young Brothers Co., Detroit, industrial oven manufacturers. Messrs. Russel and Shorek have been associated with the company for several years.

♦ ♦ ♦

**R. S. Bradley** has been named director of Research and Engineering Division, a newly created division of A. P. Green Fire Brick Co., Mexico, Mo. The new division consists of three sections: Research Engineering, headed by **A. R. Lesar;** Industrial Engineering, by **W. D. Clark;** and Plant Engineering, **J. C. Potts.**

♦ ♦ ♦

**Wilson W. Wheeler,** has been appointed sales manager, Askania Regulator Co., Chicago. Mr. Wheeler was graduated from Purdue University in 1932 and was engaged as a mechanical engineering consultant in Cincinnati until 1941. He joined the sales engineering department of Askania Regulator Co. at that time and became head of the department in 1945.

♦ ♦ ♦

**Maj. A. E. Carpenter,** president, E. F. Houghton & Co., Philadelphia, recently celebrated his 45th anniversary with the company, which manufactures industrial oils, chemicals and leathers. His grandfather, Aaron E. Carpenter, who helped to found the company, was president for 49 years, and his father, Charles E. Carpenter, with the company for 49 years, served as president until his death in 1929.

♦ ♦ ♦

**Ray S. Larsen** has been appointed sales manager, Despatch Oven Co., Minneapolis, in charge of sales of finishing systems, washers, spray booths, foundry ovens and industrial heat treating equipment.

♦ ♦ ♦

**James F. Ednie,** formerly chief metallurgist, Duquesne Smelting Corp., Pittsburgh, has been appointed sales manager, National Carbide Die Co., and its subsidiary, Penn Carbide & Alloy Casting Co., McKeesport.

♦ ♦ ♦

**George R. Brockway,** since July general sales manager, the Rapids-Standard Co. Inc., Grand Rapids, Mich., has been elected vice president in charge of sales. **Wendell A. Smith,** credit manager, has been elected assistant secretary-treasurer of the company.

♦ ♦ ♦

**Bernard A. Annis,** for the past 3 years foundry engineer, Lester B. Knight & Associates, Chicago, and prior to that an engineer with Beardsley & Piper Co., Chicago, has joined Hydro-Blast Corp., Chicago, as foundry sales engineer.

♦ ♦ ♦

**Ralph G. Harmon,** formerly sales engineer in the Chicago office, the Timken Roller Bearing Co., Canton, O., has been named district manager of the company's Industrial and Steel and Tube Divisions, Birmingham.

## Whiting 25-year Club Holds Annual Meeting

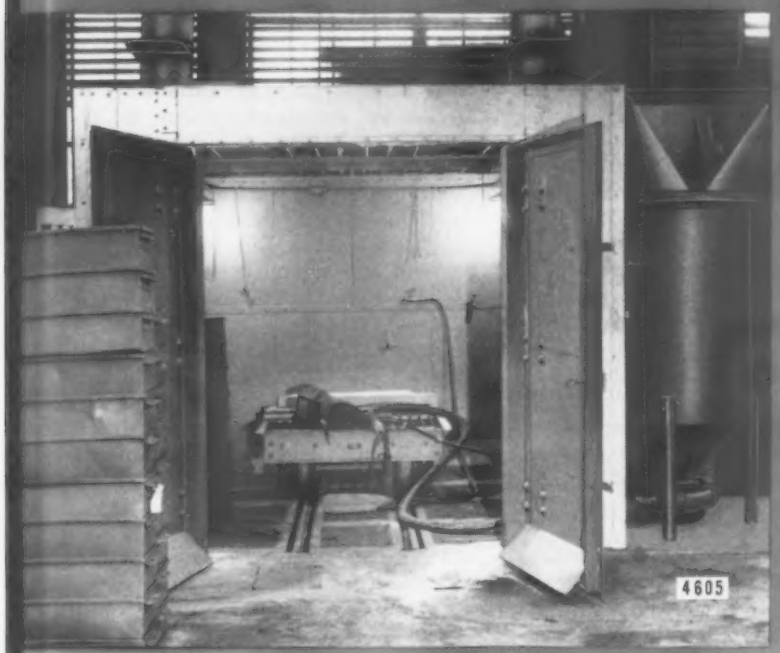
WHITING Corp.'s quarter century club celebrated its second annual meeting Feb. 24 with a dinner at Del Prado Hotel, Chicago. Each of the 116 Whiting employees with 25-year service records (plus 15 who have retired) were presented with gold wrist watches. Club membership represents about 9 per cent of total company employment.

Organized in 1947, the club has the following purposes: To encourage good fellowship among its members and to promote activities of mutual benefit to its members and the corporation, to further understanding and improve loyalty among employees and management, to hold social gatherings for better acquaintanceship among all members, and to form a nucleus upon which management can call to help make Whiting a better place to work.

New officers and directors elected at the meeting are: John Gordon, president; A. D. Corlew, vice president; Mildred Black, secretary; A. D. Hess, treasurer; John Zmuda and Joe Arendt, directors.

In the photograph above, Stevens H. Hammond, Whiting president, (left), is shown presenting a watch to his father, Gen. T. S. Hammond, chairman of the board, who also is a member of the quarter-century club.

# For YOUR CLEANING ROOM




Sly Blast Room (above) and Sly Dust Filter (below) at The Apex Electrical Mfg. Co., Cleveland, Ohio

## SLY Armoured* BLAST ROOM

This Blast Room receives the rough castings for blasting. The operator wears a Sly Helmet (shown on the car). Piping connects Room with the Sly Dust Filter.

Sly features are: excellent illumination from plenty of dust-tight lighting fixtures; over-all, down-draft ventilation from *triple* construction ceiling; safety and ease in working aided by double floor of grating and perforated plates; used abrasive automatically cleaned and returned. All these help get more production.

*An extra layer of detachable 3/16" steel wear plates to protect the walls. An extra layer of steel grating to reinforce the floor against sagging.
*(Exclusive Sly Features)*

## SLY DUST FILTER

This Dust Filter is connected with the Sly Blast Room by piping through which the dust-laden air is exhausted. Upon reaching the Filter, all dust is removed, by filtration through cloth, and drops into a hopper from which it is drawn off into a wheelbarrow underneath.

Installed five years ago, this Sly Dust Filter, like thousands of others, has given highly satisfactory service and has cost but little to operate and maintain. By efficiently exhausing the dust-laden air from the Blast Room, it has helped to do better blasting, in greater volume.

Have you a problem involving *dust* or *blast cleaning*? We'd like to hear from you.

## THE W. W. SLY MANUFACTURING CO.

**4753 TRAIN AVENUE • CLEVELAND 2, OHIO**

*Representatives in New York · Chicago · Philadelphia · Detroit · Cincinnati*
*Rochester · St. Louis · Toronto · Los Angeles · Birmingham · Minneapolis*

# ST. LOUIS PLANT VISITATIONS

## *Planned During AFS Convention*

MORE than a dozen plants in the St. Louis district are cooperating with the plant visitation committee of the St. Louis District Chapter in arranging for inspection trips by visitors during the annual convention of the American Foundrymen's Society, May 2-5. Committee chairman is Luther A. Kleber, General Steel Castings Corp., and Walter A. Zeis, Walter A. Zeis Co., is co-chairman. Jobbing and production foundries, railroad and petroleum industry specialty shops, as well as one of the largest bronze foundries in the industry, are among those which will conduct tours through their plants.

Following is a list of the plants which will be open to those attending the convention, with a brief resume of the type of products manufactured:

**American Steel Foundries, 2039 E. Broadway, East St. Louis, Ill.**—Specialty steel foundry producing railroad truck bolsters and brake beams; 25-ton basic open-hearth melting furnaces produce approximately 100 tons per day.

Open May 3 and 5, 12 noon to 4 p.m.

**American Steel Foundries, 1700 Walnut St., Granite City, Ill.**—Steel foundry specializing in railroad truck side frames and diesel electric locomotive castings; 30-ton basic open-hearth melting furnaces produce approximately 200 tons per day.

Open May 2 and 3 from 4 p.m. Can be reached by Illinois Terminal car leaving Illinois Terminal building, 12th and Franklin avenue.

**General Steel Castings Corp., Granite City, Ill.**—Produces large steel castings including locomotive frames, car trucks and other auxiliaries. Operates large machine shop.

Open May 2-5, 9:30 a.m. to 12 noon. Groups limited to 50 each. Can be reached by Illinois Traction streetcars at terminal, 12th and Delmar. Leave car in Granite City at Madison avenue and 14th street, and walk two blocks west.

**Scullin Steel Co., 6700 Manchester Ave., St. Louis**—Produces railroad specialties including locomotive and car castings as well as miscellaneous industrial castings weighing from 10 to 50,000 lb. Also produces ingots for rolling mill use weighing from 1 to 12.5 tons. Melting equipment includes four 30-ton and six 40-ton basic open-hearth furnaces. Annealing units include two 15-ton and one 7-ton car type gas fired annealing furnaces. The company also operates pattern and machine shops.

Open on May 2, 3, and 5 from 2 to 5 p.m. Can be reached by Manchester streetcar. Visitors will start from lobby of general office building.

**St. Louis Steel Casting Co., 100 Mott St., St. Louis**—Jobbing foundry producing carbon and low alloy electric furnace steel castings.

Open May 2-5 from 1 to 3 p.m. Can be reached by cab or by Olive streetcar from corner of 12th and Olive, then transferring at Broadway to Broadway streetcar. Plant is ½-block east of 6600 block on Broadway.

**Sterling Steel Casting Co., East St. Louis, Ill.**—Jobbing steel foundry producing carbon and low alloy steel castings averaging 15 lb in weight. Melting equipment is an acid electric furnace.

Open May 2-5, 9 to 11 a.m. and 1 to 3 p.m. Can be reached conveniently only by taxi or, by calling the company at Bridge 6900 one hour before visiting time, transportation will be furnished.

**Key Co., 2700 McCasland Ave., East St. Louis, Ill.**—Produces oil refinery fittings and some commercial work including special valve bodies, gates and segments. Melting equipment is an acid electric furnace. Company operates pattern and machine shops, also sand and chemical laboratories.

Transportation will be available morning and afternoon, May 3 and 4, for those signing up to visit plant in groups of preferably not more than 15.

**National Bearing Division, American Brake Shoe Co., 4930 Manchester St., St. Louis**—One of the largest bronze foundries in the industry operating both sand and centrifugal casting foundry. Produces railroad car journal bearings, locomotive castings, diesel engine bearings and bearings and wearing parts for coal mining industry, electric furnace castings and general industrial castings of practically all bronze alloys.

Open May 3 from 10 a.m. until noon for visit by not more than 40 men. Can be reached by Kingshighway or Taylor buses, also Manchester streetcars.

**Carondelet Foundry Co., 2101 S. Kingshighway, St. Louis**—Specialty jobbing foundry producing diversified line of gray iron and alloy iron castings, light and medium weight. Melting equipment includes cupola and electric furnace

Open May 3-5 between 10 a.m. and 2 p.m.

**American Manganese Steel Division, American Brake Shoe Co., 6600 Ridge Ave., St. Louis** — Jobbing

(*Concluded on page* 143)

MELTING DEPARTMENT scene in a St. Louis gray iron foundry. The plant is that of Century Foundry, subsidiary of Century Electric Co.

**Fourth in a series of Unusual Grinding Wheel Operations**

# KEEN EDGE MACHETES ARE A JUNGLE "MUST"

● This machete, known by the natives of Central America as the "Collins Knife", is used for slashing through jungles, on sugar and coffee plantations . . . and for self protection. It is sharpened to a razor-finish and is standard "dress" equipment for nearly all natives.

Whatever YOUR grinding problem may be, BAY STATE can solve it . . . fast. Possibly the exact specifications to meet your requirements can be supplied directly from large stocks either in Westboro, branch warehouses, or from our distributors strategically located throughout the United States.

Send us your grinding problems. We can help you.

**BAY STATE ABRASIVE PRODUCTS CO.**
**Westboro, Mass., U. S. A.**

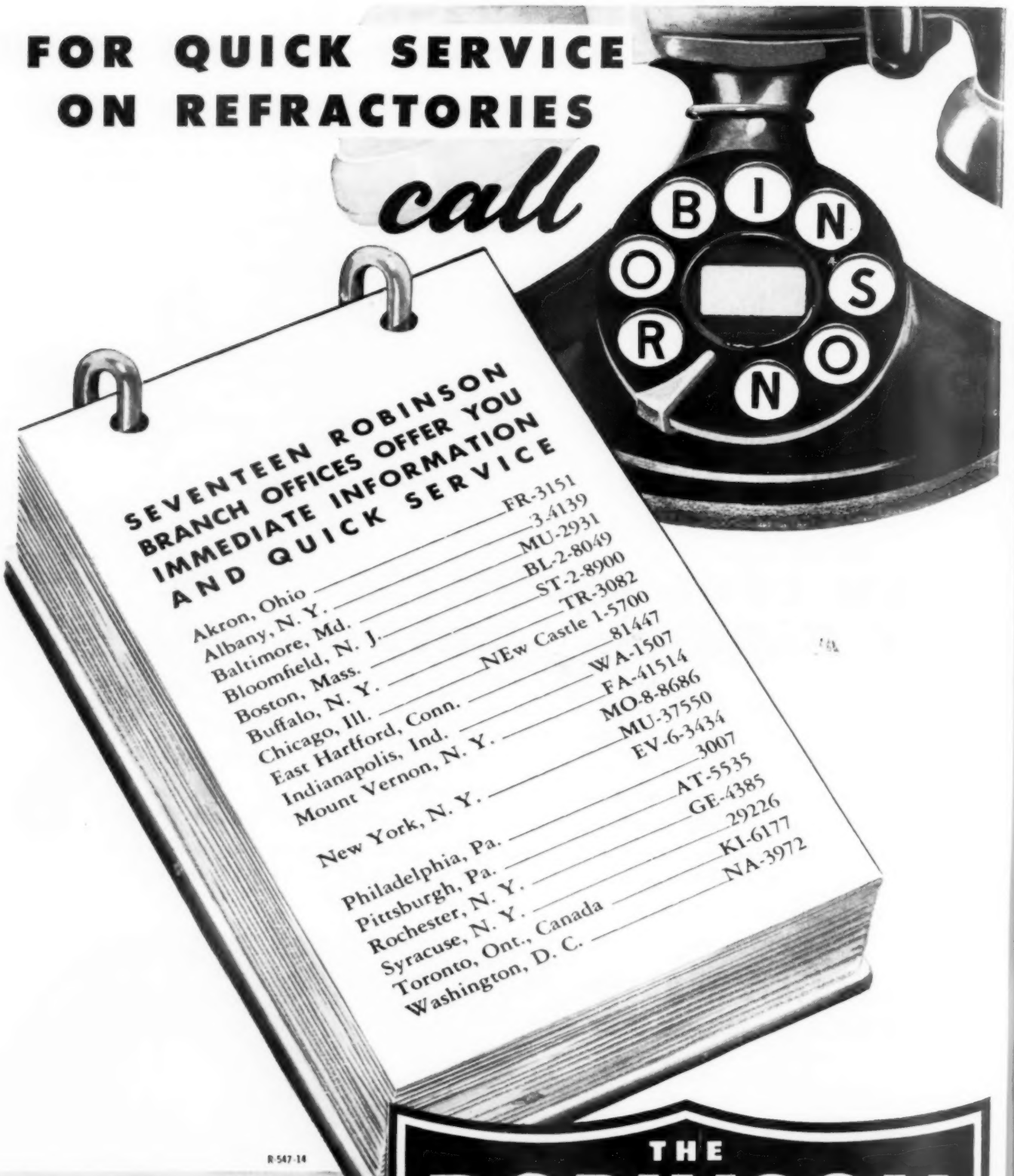
*Branch Offices and Warehouses —*
*Chicago, Cleveland, Detroit*
*Distributors — All Principal Cities*

**BAY STATE®**

MEMBER OF THE GRINDING WHEEL INSTITUTE

*Top Performance Consistently Duplicated*

# FOR QUICK SERVICE ON REFRACTORIES call




R 547-14

**REFRACTORIES PRODUCTS:** Silica and Fire Clay Brick, Ground Fire Clays, High Temperature Bonding Mortars, Castable Refractories, Acid-Proof Cement, Plastic Fire Brick, Insulating Fire Brick.

**BUILDING PRODUCTS:** Clay Pipe and Fittings, Septic Tanks, Clay Liner Plates, Flue Lining, Clay Stove Pipe, Chimney Tops, Wall Coping, Meter Boxes, Fire Brick, Acid-Proof Cement.

**YOUR ANSWER TO INQUIRIES** regarding Clay Pipe, or other Robinson Products is as near as your phone. Call today for quick service or information on any of Robinson's building products.

THE
# ROBINSON
## CLAY PRODUCT CO.
## AKRON 9, OHIO

(*Concluded from page* 140)

foundry producing manganese steel castings used in mining, dredging, steel, petroleum and railroad industries. Castings weigh a few ounces to 7000 lb. Operates machine and pattern shops, also chemical laboratory.

Open May 2-5 from 1 to 3:30 p.m. Can be reached by taxi, East avenue and Hodiamont streetcars or Jennings bus.

**East St. Louis Castings Co., 4200 St. Clair St., East St. Louis, Ill.**—Mechanized foundry producing light gray iron castings for electrical appliances, stove fittings, pumps, etc. Continuous melting by cupola and pouring about 40 tons per shift.

Open May 2-5. Can be reached by crossing Eads Bridge onto Broadway avenue in East St. Louis, north on Tenth street, to St. Clair avenue, and east to 4200.

The following plants will be open to visitation by invitation or appointment only: American Car & Foundry Co., St. Louis; Century Foundry, St. Louis; Fulton Iron Works, St. Louis.

## Booklet Pictures Foundry Operation

Forest City Foundries Co., 2500 West 27th St., Cleveland 13, has published a colorful, 36-page booklet entitled "Mechanized for Quality Castings—Better Service." The booklet is profusely illustrated with photographs of foundry operations and the modern equipment employed in producing castings.

Text material explains the handling of customer orders and the use and operation of equipment pictured. Daily melting, laboratory and control test reports, cupola operation record and temperature log sheet are typical of practice designed to produce uniform quality castings.

## Navy Opens New Testing Lab

What is said to be the most complete laboratory of x-ray and other nondestructive testing apparatus in the world was opened officially at White Oak, Md., Mar. 24-25 when the new Naval Ordnance Laboratory held its first nondestructive testing symposium.

The x-ray equipment acquired, and yet to be acquired, by the laboratory will have a value of close to $300,000 and will be installed in eight x-ray rooms in the laboratory building.

Purpose of the laboratory is to set standards in nondestructive testing methods that will make them more effective in raising the quality of ordnance and other military equipment used by the Navy, and decrease the cost of nondestructive testing for the benefit of Navy suppliers. It also will do research into new techniques of x-ray and other nondestructive testing methods, and will attempt to promote the use of such testing for controlling manufacturing procedures.

Oakland Foundry Co., "A" St. & Florida Ave., Belleville, Ill., is opening a branch plant, Santa Clara Stove Co., at Campbell, Calif., near San Jose. Joseph Fickinger and Relfe Ehret will be in charge

## British Founders Visit American Plants

SIXTEEN British steel foundrymen arrived in this country Mar. 14 to study American industrial methods and equipment. This is the first of about 35 British groups to come here this year under the auspices of the Anglo-American Council on Productivity, which is under the sponsorship of the Economic Co-operation Administration.

The foundry group, consisting of six labor and four management representatives, plus six technicians, is headed by F. A. Martin, managing director, Osborn Foundry & Engineering Co. Ltd., Sheffield, England. Others include J. W. Jackson, assistant to the executive director, English Steel Corp., Sheffield, and also team secretary; J. Jackson Elphick & Co., Lanarkshire; W. L. Hardy, Lake & Eliot, Essex; R. MacNab, Clyde Alloy Co., Scotland; D. Colbridge, David Brown Foundries Co., Yorks; E. Daybell, K. & L. Steelfounders, Hertfordshire; D. A. Aston, F. H. Lloyd Ltd., Wolverhampton; S. Taylor, English Steel Corp.; H. J. L. Ray, Staffordshire; W. Hammond, Sheffield; T. H. Lamb, County Durham; W. Scott, Scotland; H. W. Taylor, Sheffield; B. Travis, Sheffield, and L. Skidmore, Hertfordshire.

First foundries visited by the team were American Steel Foundries, Newark, N. J., and Cooper Alloy Foundry Co., Hillside, N. J. Above scenes at the latter company show, left to right: At top, J. Jackson, F. A. Martin and D. W. Talbott, vice president and general manager, Cooper Alloy Foundry Co. At bottom, H. W. Taylor, B. Travis, H. J. Cooper of Cooper Alloy, C. J. Jernstrom, vice president of Cooper Alloy, and T. H. Lamb.

# For MAXIMUM Coreroom Production

# COLEMAN Core

## PROVED BY OVER 10,000 SUCCESSFUL INSTALLATIONS!*

There is no substitute for experience in building core and mold ovens. Coleman Ovens, today, are the result of over 40 years of specialized experience in designing and building over 10,000 installations of foundry ovens. As a result, foundries of all types find that their Coleman Ovens pay dividends in production far beyond their expectation! Only in COLEMAN OVENS will you secure all these advantages:

**PERFECT BAKING AND DRYING.** Coleman Ovens eliminate all uncertainties in core baking and mold drying. Rejects and make-overs are eliminated.

**INCREASED LABOR SAVING.** Efficient and modern mechanical design reduces handling and other indirect labor to a minimum.

**DEPENDABLE PERFORMANCE.** Heavy duty construction assures steady day in and day out operation with a minimum of down time, and lowest upkeep expense.

**MAXIMUM FUEL ECONOMY.** Coleman Heating Systems are noted for their low fuel consumption. For operation with the lowest cost fuel in your locality—gas, oil, stoker-coal, electricity, etc. Combination systems available.

**BETTER WORK CONDITIONS.** Positive ventilation built into Coleman Ovens prevents leakage of fumes and gases and helps to make the core department a good place to work.

### *A FEW OF THE THOUSANDS OF COLEMAN OVEN OWNERS

| | | | |
|---|---|---|---|
| Ferro Machine and Foundry, Inc. | General Motors Corp. | General Electric Co. | American Brake Shoe Co. |
| Natl. Mall. & Steel Castings Co. | Cooper Bessemer Corp. | American Foundry Co. | Aluminum Co. of America |
| Worthington Pump & Mach. Corp. | Cleveland Foundry Div. | Walworth Co. | Oberdorfer Foundries, Inc. |
| Cincinnati Milling Machine Co. | American C. I. Pipe Co. | Lincoln Foundry Corp. | International Harvester Co. |
| Westinghouse Electric Corp. | Minneapolis Moline Co. | Somerville Iron Works | Pac. States C. I. Pipe Co. |
| Lakey Foundry & Mach. Co., Inc. | Lynchburg Foundry Co. | Singer Mfg. Co. | American Steel Foundries |

★ *Write today for Bulletin 48.*

COLEMAN OVENS ARE AVAILABLE IN A WIDE RANGE OF SIZES AND CAPACITIES FOR VARIOUS PRODUCTION NEEDS, ASSURING DEPENDABLE PERFORMANCE AT LOWEST POSSIBLE COST

## THE FOUNDRY EQUIPMENT COMPANY

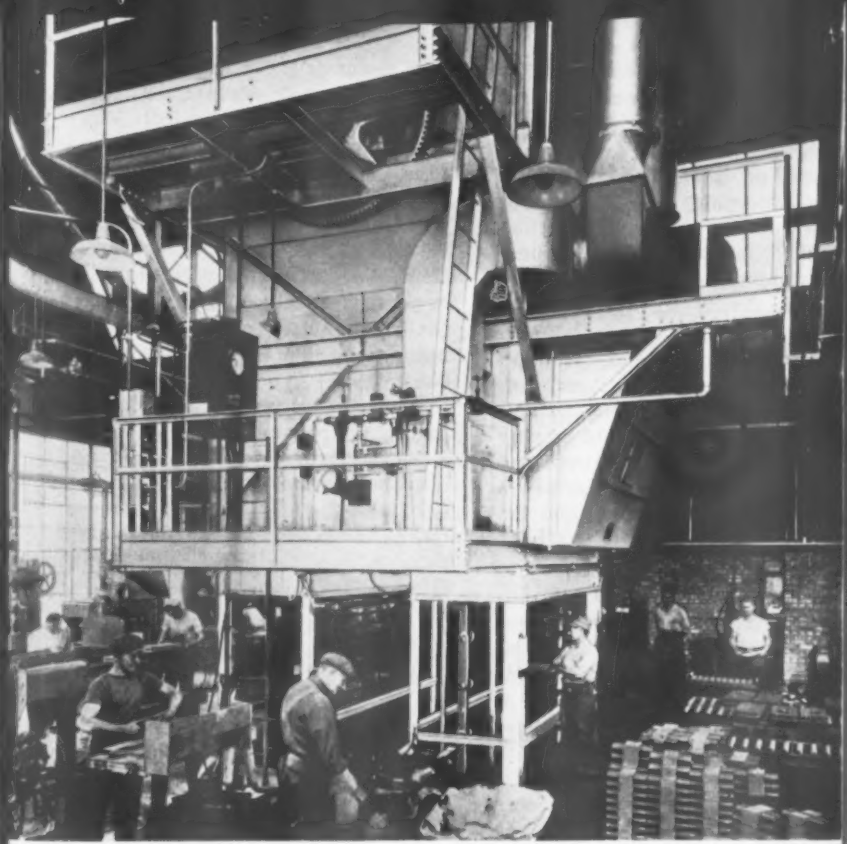
**1831 COLUMBUS ROAD** **CLEVELAND 13, OHIO**

World's Oldest and Largest Foundry Oven Specialists • Over 10,000 Successful Installations

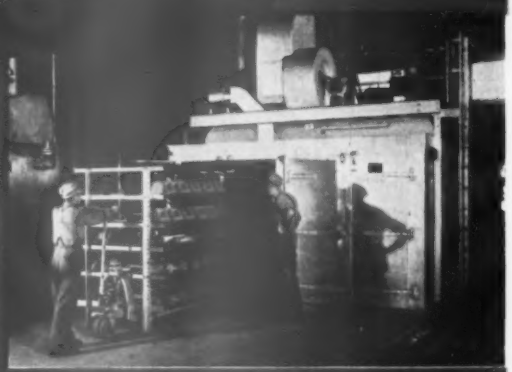
MEMBER

on at LOWEST Possible Cost !

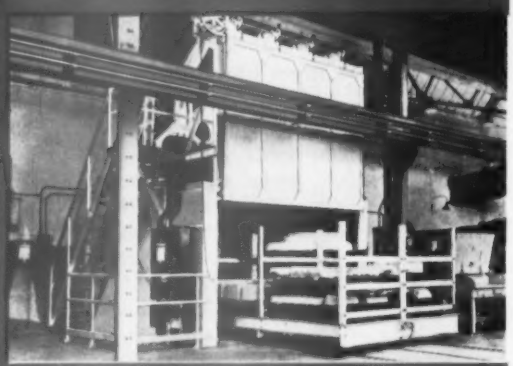
re and Mold OVENS



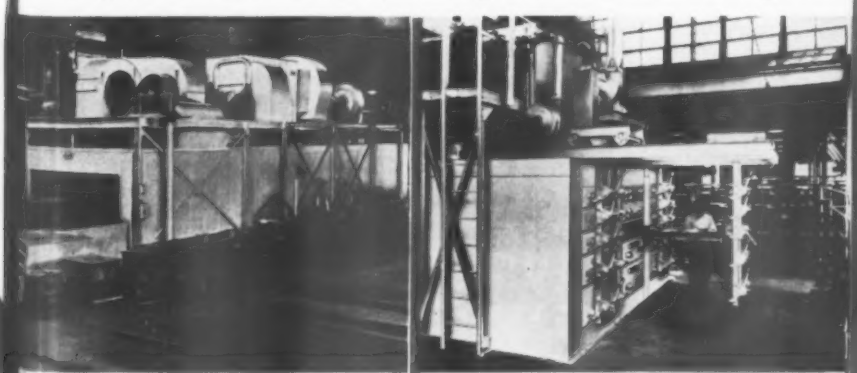
COLEMAN TOWER OVENS
For high speed production at lowest cost. Patented Open Center permits loading from inside and out, providing maximum labor saving.



COLEMAN TRANSRACK OVENS. For use with portable racks to reduce handling labor. Very efficient where ample floor space is available.



COLEMAN CAR-TYPE OVENS. For baking large cores or drying molds. Coleman Car-Type Ovens are used by most of the leading producers of heavy castings.



COLEMAN CONTINUOUS MOLD OVENS. For high speed continuous drying of molds. They provide amazing drying speed at a fraction of the cost of former methods.

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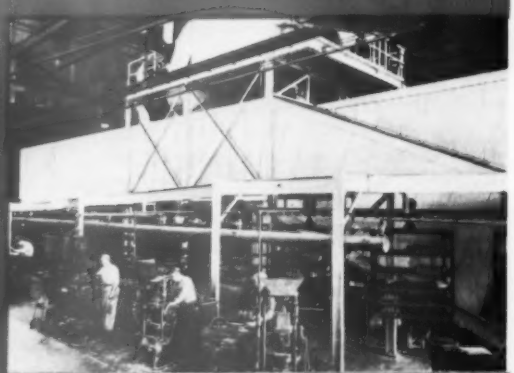


COLEMAN HORIZONTAL CORE OVENS. Overhead conveyor ovens specially designed for large scale production foundries in such fields as agricultural, automotive, and others.

By A. H. ALLEN
*Detroit Editor*
THE FOUNDRY

# AROUND Detroit

*Gradual reduction in percentage of scrap castings reflects improvement in quality and uniformity of raw materials, but automatic machining makes defective castings a problem*

HIGH percentage of scrap in automotive gray iron foundries is easing off gradually as the quality and uniformity of raw materials improve. Coke has been of more consistent grade for the past six months or more. Pig iron is readily available now and there is no need to resort to the use of foreign material such as many foundries have done in emergencies since the war. Instances are reported of merchant blast furnaces finding tonnages going begging, making it necessary to pile their iron. Foundry scrap for melting is plentiful but there are no buyers and the price has sagged to less than half what it was bringing late last year.

Even with the greatly improved materials outlook, scrap castings are too numerous and are the bane of the high-production motor machining departments. In recent years, the trend in machining operations has been toward the large automatics and transfer-type machine tools—integrated units with as many as 20 stations hooked up electrically in sequence so so that all the operator needs do is to push buttons and the castings are processed through the various milling, drilling, reaming, tapping and related machining steps. Should a bad casting be encountered, with a blowhole or sand inclusion at a critical point, the result may be a broken drill or other tool. This immediately shuts down the entire line until new tools can be installed, and valuable production time is lost.

Formerly, when machining operations were performed on individual machines, with a float of parts between succeeding steps, the stoppage of one unit for tool replacement did not figure so importantly as it does now. Thus the anguished outcries against the foundry over defective castings are understandable. Even though scrap might not be any higher than prewar, its slowing effect on automatic machining lines is far more serious.

At the same time, the foundryman has no way of determining the presence of internal defects without the use of some nondestructive test method impractical of application to automotive components. About all he can do is to keep careful check on his metal analysis, pouring temperatures, molding and coremaking, in the knowledge that uniformity there should be productive of uniformity in the castings. That is why melters are encouraged over improvements in quality of raw materials, a factor over which they have had little control.

Pressure on costs continues to mount throughout all sections of automobile manufacturing plants. Price cuts on basic materials—lead, antimony, zinc, copper, ferrous and nonferrous scrap—have been reflected in lower prices on products using these materials. Storage batteries, for example, have been marked off, while automotive purchasing departments report lively competition for castings business has developed among suppliers of both gray iron and malleable, with price shading in evidence. Price reductions on the order of 5 per cent have been effected in certain standard parts, effective May 1.

The auto industry has become convinced it must trim prices of new cars, not so much because of any softening in sales but simply because general opinion is that prices are too high. General Motors' cut of $10 to $30 late in February may be followed by another of similar proportions at the end of this month if wages come in for another downward revision. Already the Bureau of Labor Statistics price index has moved down from the Jan. 15 level on which the GM wage adjustment was based. The next revision will be determined by the index figure for Apr. 15, to be announced at the end of May. Meanwhile, however, GM hourly-rated employees will receive an automatic 3-cent increase June 1 in the form of an annual "improvement factor" which conceivably could cancel out any reduction dictated by the new BLS index.

Kaiser-Frazer's sharp cut in prices (up to $333) reflected the determination of this producer to bolster lagging sales, and at first check this appeared to have been accomplished, in the opinion of dealers. However, there were close to 19,000 cars in dealers' field stocks when the price change was announced and, while production at Willow Run has been resumed on a limited scale, it will take time to clear these field stocks, as well as a $4.5 million reimbursement to dealers as a result of the price change.

Detroit was agog over reports Ford would offer General Motors' Hydra-Matic transmission on its Lincoln models starting in June. Ford engineers have been hard at work for several years in the development of automatic transmissions, but appearently have not developed a suitable unit as yet which could be built economically for the limited production required for Lincoln. For its part, General Motors might have no objections to furnishing the transmissions to Lincoln, since the Hydra-Matic design actually may be on the way out, to be succeeded in the next three or four years by the torque-converter type of transmission used in Buick, and slated to appear this fall in Chevrolet.

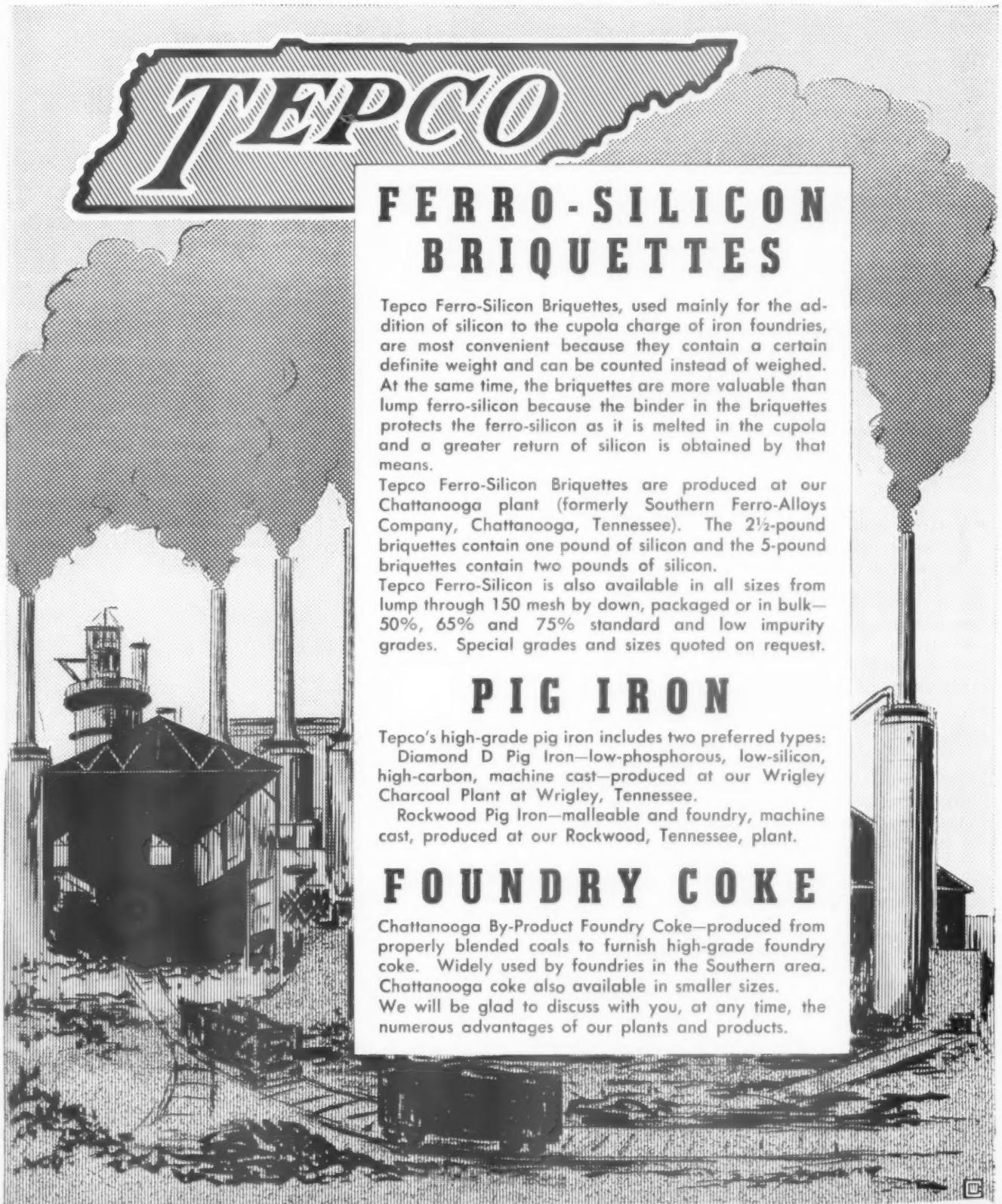
* * *

One of the highspots on the program of the recent "production clinic" of the Society of Automotive Engineers was a detailed study of the new V-8 Cadillac high-compression engine, presented by E. N. Cole and H. F. Barr, chief engineer and staff engineer, respectively, of the Cadillac Division. Around the automotive industry, this unique new power plant is considered to be just about the hottest thing to come up in the engine field in a long while, particularly in view of the remarkable weight reduction achieved—over 200 pounds in engine and radiator, dry, in comparison with the 1948 model of the V-8, with an accompanying increase in horsepower. The engine is one of the first "oversquare" types to appear in the passenger car field, the bore being 3 13/16 inches and stroke 3⅝ inches. This permits a "squattier" design, along with considerably increased strength in structural components and moving parts.

Cylinder block and crankcase casting has been reduced in weight from 303.1 pounds to 191.7 pounds, while the new casting is much stronger

(*Concluded on page* 148)

# TEPCO



## FERRO-SILICON BRIQUETTES

Tepco Ferro-Silicon Briquettes, used mainly for the addition of silicon to the cupola charge of iron foundries, are most convenient because they contain a certain definite weight and can be counted instead of weighed. At the same time, the briquettes are more valuable than lump ferro-silicon because the binder in the briquettes protects the ferro-silicon as it is melted in the cupola and a greater return of silicon is obtained by that means.

Tepco Ferro-Silicon Briquettes are produced at our Chattanooga plant (formerly Southern Ferro-Alloys Company, Chattanooga, Tennessee). The 2½-pound briquettes contain one pound of silicon and the 5-pound briquettes contain two pounds of silicon.

Tepco Ferro-Silicon is also available in all sizes from lump through 150 mesh by down, packaged or in bulk—50%, 65% and 75% standard and low impurity grades. Special grades and sizes quoted on request.

## PIG IRON

Tepco's high-grade pig iron includes two preferred types:

Diamond D Pig Iron—low-phosphorous, low-silicon, high-carbon, machine cast—produced at our Wrigley Charcoal Plant at Wrigley, Tennessee.

Rockwood Pig Iron—malleable and foundry, machine cast, produced at our Rockwood, Tennessee, plant.

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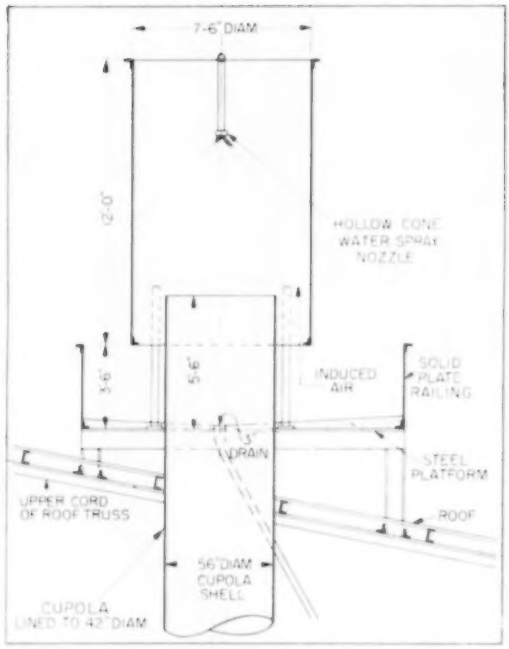



### *Designs Simple Type of*

# Cupola Dust and Spark Arrestor

THE cupola dust and spark arrestor shown in the accompanying illustration was designed by Emil A. Piper, chief engineer, Pohlman Foundry Co., Buffalo, and installed on that company's two cupolas. The equipment is simple, consisting of a cylindrical steel shell telescoped over the top of the cupola shell, a hollow-cone water spray nozzle and a platform on which the dust-laden water collects. Four legs support the cylindrical shell above the platform.

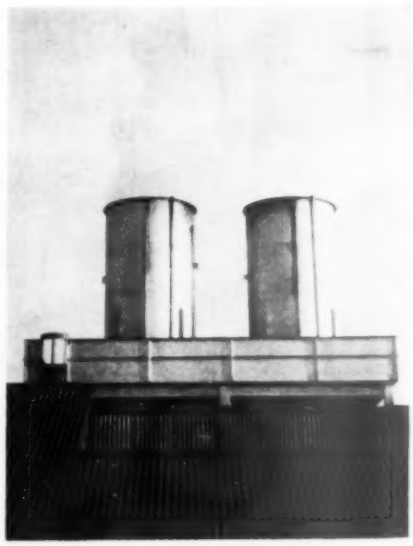
Cupola flames are quenched by the water spray, which also precipitates the ashes and cinders in the smoke. Considerable cool air is drawn through the annular space between the cupola and the shell; in fact, anemometer readings indicate that the weight of this induced air is about two times the weight of the combustion gases within the shell. This excess air also keeps the shell relatively cool and actually permits operation of the dust collector without water.

When the installation was first made it was run as a dry collector for about two months. The outstanding feature of the unit when operated dry was the fact that, except for an occasional leaping up of a white flame resulting from secondary combustion, and which was visible only on a very dark day, the flame from the cupola was quenched and did not appear above the shell. At the same time, a large volume of cinders was collected on the platform, and the shell remained fairly cool. Fine dust particles of course escaped and were carried away by the wind. Wet operation has proved most effective in collecting the fine, as well as the coarse, dust particles.

In order to dispose of the dust-laden water the platform is pitched slightly toward a drain. In the twin installation at Pohlman Foundry Co., where it serves two Meehanite Equiblast cupolas, this water first is used to granulate the cupola slag in a trough and then carries the slag, dust and cinders to a conveyor type settling tank. This tank does double duty, also serving a wet type dust collector for the foundry shakeout. Water that goes over the weir of the settling tank is not returned to the cupola dust collector but serves only as make-up water for the shakeout dust collector, with the excess going into the sewer.

The cupola dust collectors are operated with city water, the pressure of which is sufficient to obtain a satisfactory spray. The spray nozzle, equipped with renewable orifice plates, employs a ½-in. orifice and delivers 15 gallons per minute at a pressure of 35 psi. A slight wear or reaming out of the nozzle will increase the volume considerably and, at times, the collector has been operated with as much water as 25 gpm. However, the larger volume of water is said not to have visibly changed the collection efficiency.

While it is rather difficult to make accurate dust counts from such a unit, the practical result is that the foundry roofs are clean. Moreover, the company reports that the neighbors in its semi-residential section have no complaints to make. And, as Mr. Piper remarks, "it pays to be a good neighbor."



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(*Concluded from page* 146)

than the old. Nearly 9 pounds has been taken out of the clutch and flywheel housing, over 12 pounds out of the intake and exhaust manifold casting, nearly 20 pounds out of the camshafts and drive. On the other hand, because of the overhead valve design, cylinder heads had to be made considerably larger, weighing nearly 94 pounds, or 21.6 pounds more than the former L-head types.

Valve seat pounding and wear was lessened in the new engine by increasing the seat hardness of the cylinder head and providing a more uniform cooling condition in this area. Changes in water metering and improved port cooling were made to produce lower and more consistent seat temperatures. A chromium-silicon alloy ladle addition is made to the basic hard iron analysis to obtain a minimum brinell hardness of 163 at the valve seat.

Extensive tests were carried out on tappet and camshaft life, using both cast iron and steel tappet materials in combination with an alloy iron camshaft. Tappet specification included a 30-inch spherical radius on a chilled face of 55 minimum Rockwell C hardness, 10 to 15 microinch honed finish and a ferrox anticuff treatment. The camshaft nose radius was 0.235-inch, with a 7-minute taper to produce tappet rotation; cams were polished and a hardness specification of 70 scleroscope was maintained on the nose.

Pitting failures were observed on the cast iron tappets, so a switch was made to steel—SAE 5120 carburized and hardened to Rockwell C 60-63. At first these showed excessive score and wear during break-in, which proved to be not only a lubrication problem but a question of distributing the load during run-in. After various finishes were tried, it was determined to give the tappet face a controlled grit-blast after finish honing, with a lubrite treatment for better break-in.

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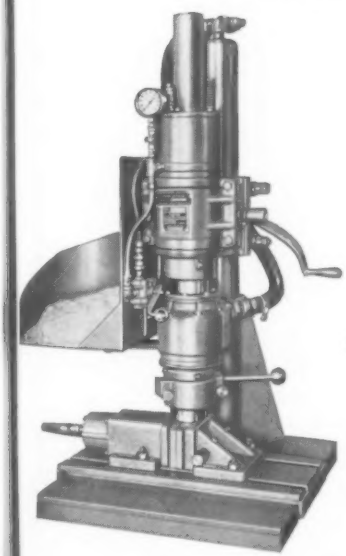
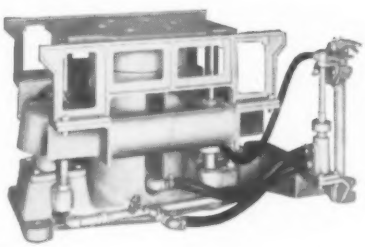
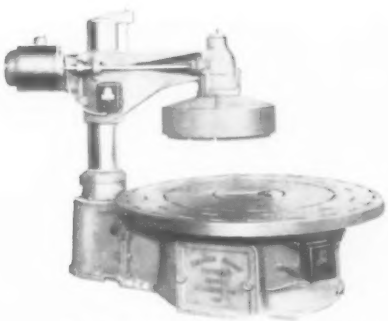


No. 3 Bench Style Milwaukee-Taccone Core Blower All types of Blowheads.

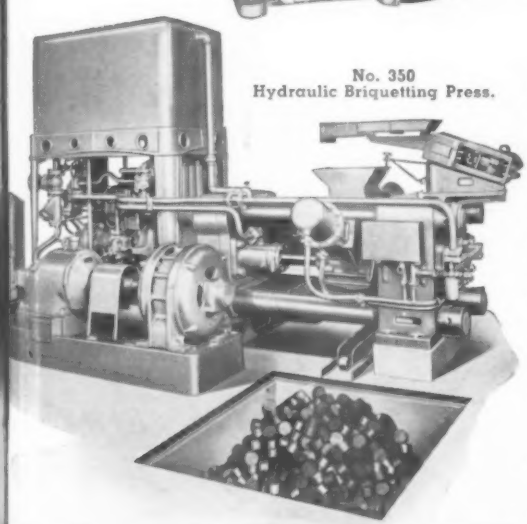


No. 620 ND Hydraulic Power Stripper.



No. 70 Rotary Type Core Grinder, illustrated above. No. 71 Dual Type Core Grinder, also available.

No. 213 — Arm Type Jolt Squeeze Rail Stripper available in 4 sizes.



No. 350 Hydraulic Briquetting Press.

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- No. 117 Hydraulic Briquetting Press
- No. 118 Jolt Squeezers
- No. 119 Core Blowers
- No. 120 Jolt Squeeze Strippers with Roll-on and Roll-off Attachments
- No. 121 Jolt Squeeze Strip — Car Type
- No. 122 Core Grinders

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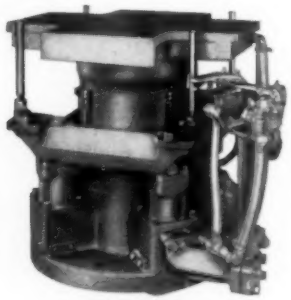

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Jolt Pin Lifter
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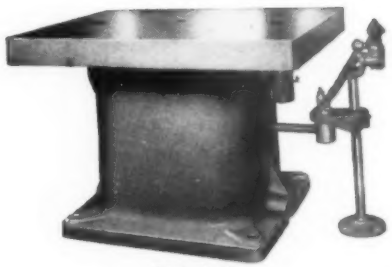

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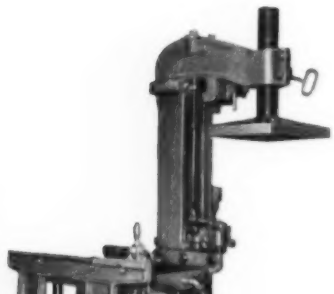
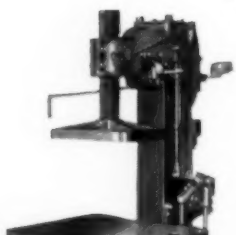


No. 166
Jolt Squeeze Strip Roll-off
available in 6 sizes.



No 161 — Stationary Type
Jolt Squeezer
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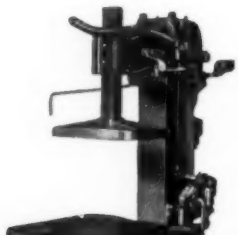
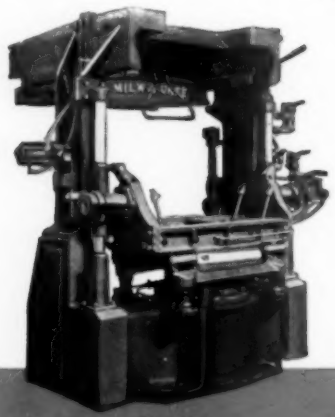


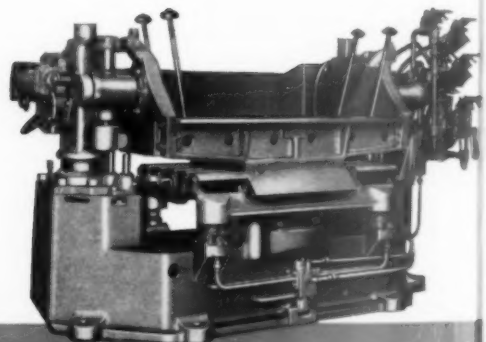
No. 165
Jolt Squeeze Pin Stripper
available in 7 sizes.

No. 124 — Portable Type
Jolt Squeezer
10" and 12" piston sizes.

No. 214 — Car Type
Jolt Squeeze Stripper
available in 3 sizes.



No. 217
Jolt Squeeze Rollover Draw.



No. 428
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available in 6 sizes.

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# OHIO REGIONAL FOUNDRY CONFERENCE

## *Stresses New Industry Developments*

By FRANK G. STEINEBACH
WILLIAM G. GUDE, EDWIN BREMER
and ROBERT H. HERRMANN
*THE FOUNDRY*

TOPICS relating to new developments in the foundry industry predominated the program of the successful second annual Ohio Regional Foundry Conference, held at Columbus, O., Mar. 11-12, under sponsorship of the five Ohio chapters of the American Foundrymen's Society and Ohio State University. All sections of the state were represented among the conference's more than 400 registrants, while members of the Ohio State student chapter were active participants in not only the technical sessions but also in arrangements for the conference itself.

The conference was opened with a general session at the university at which welcoming addresses were given by Fred W. Fuller, chairman of the Central Ohio host chapter; Dr. Douglas C. Williams of Ohio State, general chairman of the conference, and Dean C. E. MacQuigg of the school's College of Engineering.

Technical portion of the opening session consisted of two talks on the subject of casting design, with Dr. Jesse Huckert, Department of Mechanical Engineering, Ohio State University, acting as chairman. "The Design of Crankshafts and Center Frames for Diesel Engines" was the subject of a paper by T. C. Kuivinen, assistant to chief engineer, Cooper-Bessemer Corp., Mt. Vernon, O., in which he explained the use of brittle lacquer and electrical strain gages in arriving at the correct design of cast products. Illustrations were shown of cast crankshaft and engine frame designs, instances of the latter representing substantial savings in cost compared with welded assemblies of rolled steel.

In a discussion of "Sound Castings Can Be Engineered," W. T. Bean Jr., consultant, Continental Aviation & Engineering Corp., Detroit, emphasized the importance of knowing the strength of the selected material, the selection of a correct design, and ascertaining the load to which the part will be subjected. He also urged the use of modern instruments to check the casting's design, pointing out that testing a part to destruction evaluates the material but not the design. His points were illustrated by slides showing procedure in the design of aircraft engines.

Dr. Williams presided at the Friday noon luncheon at the university. The group was welcomed by Dr. Howard L. Bevis, president, Ohio State University, who described briefly the school's activities in the three fields of teaching, research and service. Dr. Paul N. Lehoczky, chairman of the Department of Industrial Engineering at the university, discussed the foundry curriculum offered students, and explained that the aim is to develop an individual who is not only well grounded in the fundamentals on which foundry operations are based, but one who has been provided training in subjects which will give him a broad education.

More than 250 attended the dinner Friday night at the Deshler-Wallick Hotel. Norman J. Dunbeck, Eastern Clay Products Co., Jackson, O., was toastmaster, and W. B. Wallis, national president, AFS, spoke briefly on the value of regional foundry conferences to the parent society. He said he believed that they should be held in conjunction with colleges and universities, and should be carried on from year to year, thus benefiting students as well as foundrymen in the region.

Principal speaker was Dr. Eleroy L. Stromberg, Western Reserve University, Cleveland, who discussed methods of selecting foundry machine operators. He said that usually not enough time is spent in selecting operators so that there is considerable turnover in their ranks. However, he pointed out that study of various factors resulting from a survey or test of molding machine operators in a few plants led to the development of two simple methods whereby a high percentage of suitable workers could be selected.

One is oral questioning by the personnel department to obtain biographical data on the applicant, an interview requiring a maximum of 20 minutes and often only half that time. In addition, the applicant is given a discrimination-dexterity test, involving the use of colored blocks, which takes 6 minutes or less.

Opening session on gray iron was held under the direction of E. H. King, Hill & Griffith Co., Cincinnati, with Harry W. Dietert, Harry W. Dietert Co., Detroit, as speaker. Mr.

(*Continued on page* 153)

*Left*—Speakers' table at the annual banquet during the Ohio Regional Foundry Conference in Columbus. *Right*—More than 400 registered for the conference at Ohio State University. (All conference photos courtesy of Wilfred H. White, Jackson Iron & Steel Co., Jackson, O.)

*Albert D'Girolamo, foreman of core shop, Chicago Steel Foundry Company.*

# IT'S A FACT!

A few of the numerous types of cores in regular production at Chicago Steel Foundries.

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"Delco 30 Series Core Oil made a big difference all down the line. Sand works better in hand rammed or blown cores. Green strength is improved, which cuts down spoilage. But the big difference is in saving time and fuel in the oven by cutting down both time and temperature with no sacrifice of results in the finished core."

You may be a doubter, too, but it is easy to get the facts about Delco 30 Series Core Oils. Cities Service sales engineers are ready to supply full information and assistance in choosing and applying the correct grade for your specific requirements. Contact your local Cities Service representative for information and immediate service assistance. Cities Service Oil Company, Chicago, Cleveland, Kansas City, St. Paul and Toronto, and Arkansas Fuel Oil Company, Shreveport.

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Conference speakers, left to right: Dr. E. L. Stromberg, Western Reserve University; Paul H. Flynn, International Nickel Co.; T. C. Kuivinen, Cooper-Bessemer Corp.; R. G. Scott, Commercial Steel Castings Co.; Dean C. E. McQuigg, Ohio State University

(*Continued from page* 151)

Dietert said that ability of a molding sand to maintain dimensional stability of the cavity can be determined by its green deformation; sands with high deformation permit enlargement of the cavity.

Deformation can be decreased by additions of sea coal, pitch, or wood flour, low-plasticity clay and by reduction of moisture. However, the deformation cannot be too low since the sand becomes "brittle," resulting in erosion at parting line and sharp edges, dirt inclusions and drops. Deformation can be increased by raising moisture content, addition of cereal, high-plasticity clay and silica flour. Many casting defects result from the dry and hot strengths being too high. For example, high dry strength enhances scabbing while high hot strength at 500°F does the same, and at 1100°F results in rat tails. Best results appear to be obtained when hot and dry strengths are maintained between 20 and 80 psi from 500 to 2000°F.

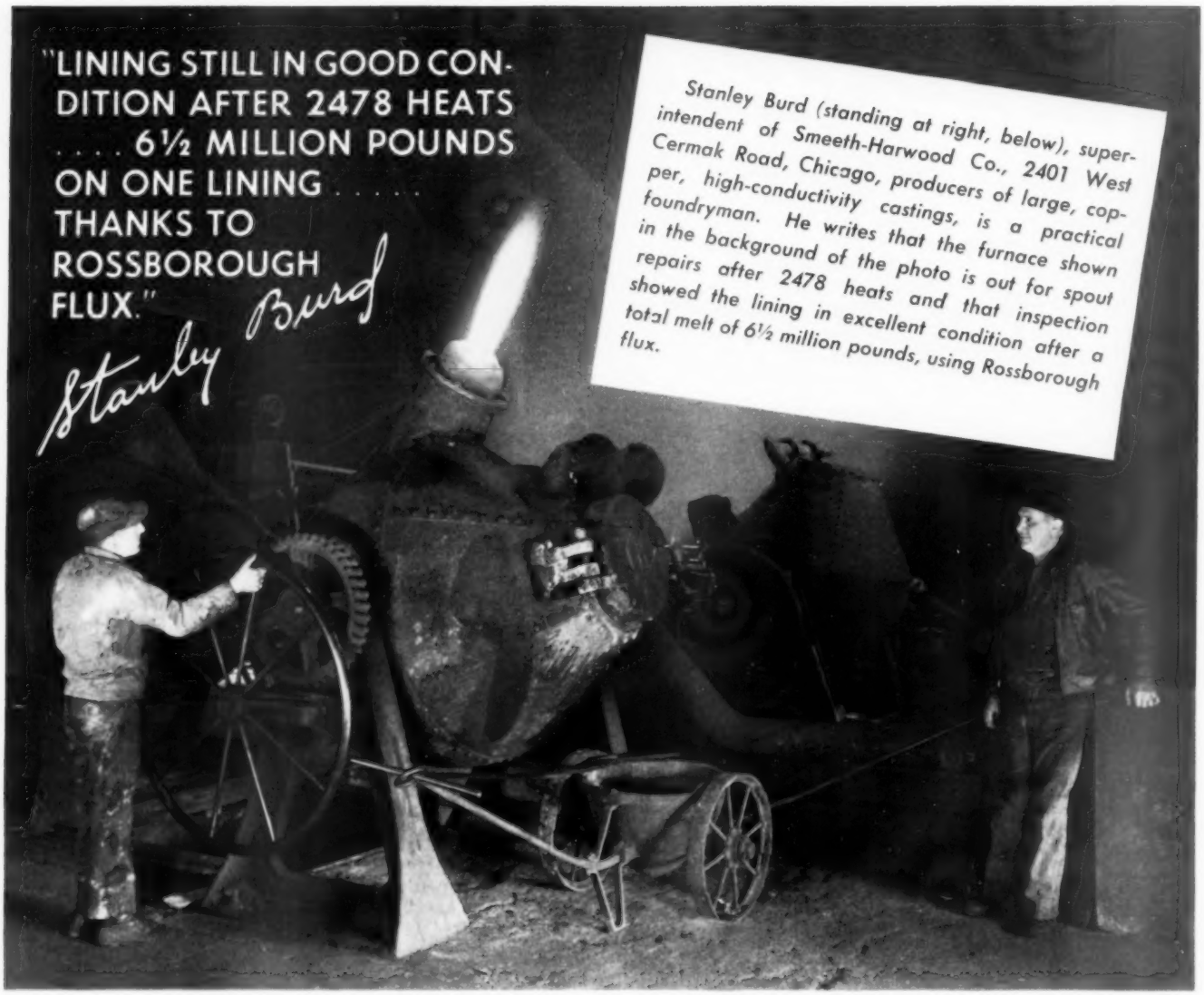
Mr. Dietert described some simple equipment for determining the operating characteristics of core sand mixtures, including ability to stand up, ease of rolling out of a box, overhang ability and resistance to sagging. He also discussed some work carried out on use of "carbon" sand, consisting of graphite and coke mixed together in varying amounts to attain desired thermal conductivity characteristics; graphite being a high conductivity and coke a low conductivity material. Bentonite is used as the bond for the molding material which is said to have low expansion, show no burn on, and peel from castings easily.

Second session on gray iron, with Herman K. Ewig, Cincinnati Milling Machine Co., Cincinnati, and Lloyd W. Leeseberg, Superior Foundry Inc., Cleveland, as chairmen, was concerned with "Recent Developments in Cupola Operation." Speaker was L. L. Clark, Buick Motor Car Division, Flint, Mich., and he described various practices in his plant. It was found that trouble from cold iron on first tap was corrected by placing 42 to 45 per cent of the bed coke, igniting with all tuyeres open, and allowing it to attain a white heat. Then the remainder of the bed coke is charged, followed by filling the cupola with alternate iron and coke charges. All bed coke is forked.

Cone-bottom charging buckets are used since they throw the iron to the periphery of the cupola. Coke charged with a funnel-like hopper goes to the center. Iron and coke are charged separately. All sprue and small defective castings are cleaned in long tumbling mills to provide clean material, and that practice made a substantial saving in coke. Recently tumbling was extended to scrap cylinder blocks which are first crushed. Endeavor with raw material for metal charge is to secure it in uniform size so that the open area is 45 per

(*Continued on page* 155)

Other conference speakers, left to right: R. M. Landis, General Electric X-Ray Corp.; W. T. Bean Jr., consultant; L. L. Clark, Buick Motor Division; Fred Pfarr, Lake City Malleable Co., and Milton Tilley, National Malleable & Steel Castings Co.; C. O. Burgess, Gray Iron Founders' Society


"LINING STILL IN GOOD CONDITION AFTER 2478 HEATS .... 6½ MILLION POUNDS ON ONE LINING .... THANKS TO ROSSBOROUGH FLUX."
Stanley Burd
Stanley Burd (standing at right, below), superintendent of Smeeth-Harwood Co., 2401 West Cermak Road, Chicago, producers of large, copper, high-conductivity castings, is a practical foundryman. He writes that the furnace shown in the background of the photo is out for spout repairs after 2478 heats and that inspection showed the lining in excellent condition after a total melt of 6½ million pounds, using Rossborough flux.

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## ROSSBOROUGH SUPPLY CO.

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(*Continued from page* 153)

cent; otherwise high blast pressures and more coke must be used. Iron charges weigh 6000 lb, and the iron-to-coke ratio is 9½ to 1, using cupolas lined to 72 in.

Third session on "Production and Properties of Nodular Iron" was addressed by Charles O. Burgess, Gray Iron Founders' Society, Cleveland, with A. W. Schneble, Advance Foundry Co., Dayton, O., and Dr. C. H. Lorig, Battelle Memorial Institute, Columbus, O., as chairmen. Mr. Burgess described developments to date in production of nodular irons and properties of the material. A detailed report on this subject by Mr. Burgess is presented elsewhere in this issue.

### Reduce Production Costs

Concluding session on gray iron was under the chairmanship of J. D. Judge, Hamilton Foundry & Machine Co., Hamilton, O., and E. E. Ballard, Lester B. Knight & Associates, Chicago, was the speaker. In discussing the modern gray iron foundry, Mr. Ballard pointed out that competition must be met by reducing production costs and conserving energy. Hence, the first step is to make a careful survey of equipment, operations and personnel to determine where the changes should be made to bring about the necessary improvement. The survey should cover movement of materials from receiving dock to shipping platform to eliminate any bottlenecks, and to conduct those movements with the least expenditure of energy.

Modernization and mechanization are two different terms, although used synonymously by many. The former means improving and bringing up-to-date while the latter means application of mechanical equipment. Hence, while all foundries may be modernized, the amount of mechanization may vary widely, depending upon size of foundry, type of castings, etc. In modernization, plans are based on a maximum of five years for amortization, but preferably three years. It is not necessary always to have sufficient funds to carry out a modernization program at the beginning. Through survey and study it is possible to set up a floating fund to begin the program at the point of greatest savings. These savings will permit the next step, and so on, with the result that the whole operation can be completed with only one-fourth to one-sixth of the total expenditure being involved at one time.

Principal speaker at the first nonferrous sectional meeting was Glenn W. Mehltretter, International Nickel Co., Bayonne, N. J. The discussion period was handled by Paul H. Flynn, International Nickel Co., and John G. Kura, Battelle Memorial Institute, Columbus, O., was chairman.

Title of Mr. Mehltretter's talk was "Investment Casting As We Know It Today," and he described in a general way operations at the precision investment foundry of International Nickel Co. Starting with the development of 50-50 tin-bismuth alloy dies for use in making wax patterns, he outlined the various steps in production of precision investment castings.

In answer to a question on casting size, Mr. Flynn stated that one of the major limiting features is the handling of large molds at temperatures of 1300°F; large molds tend to crack because of the weakness of the investment material. The Bayonne Works limits its production to castings of 5 or 6 lb and 10 in. long. The company has not used composite molds as a means of increasing casting size, but Mr. Flynn stated that he had heard of other companies practicing this method.

William Ball, R. Lavin & Sons Inc., Chicago, spoke on "Another Approach to New Developments in Making Nonferrous Castings" at the second nonferrous session. H. T. Schwab, Bunting Brass & Bronze Co., Toledo, O., was chairman. Mr. Ball stated that he was going to talk about a substitute for a new development rather than about a new development. It is his opinion that foundrymen should solve the simple things before they look for more new ideas.

He suggested that when foundrymen start a casting job, they should ask themselves the following questions:

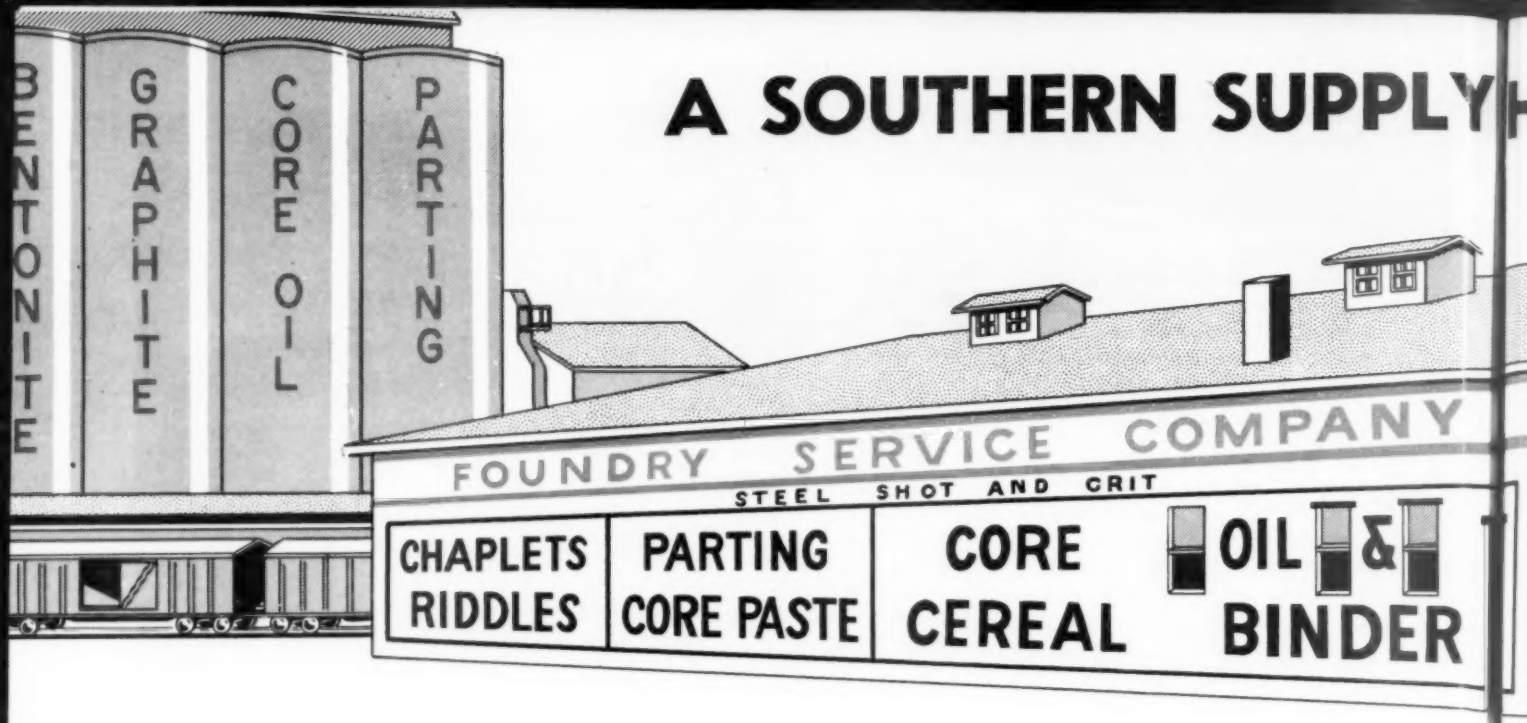
1. What metal is to be used? The behavior pattern of the metal must be understood; this affects gating, pattern, mold procedures, etc.
2. Is the piece to be a pressure casting?
3. Is it to be chromium plated?
4. How many castings are to be made?
5. How many pieces are to be produced each day or week?

He also outlined the procedure he considers necessary for proper development of the casting: Use correct pattern; use correct type and size flask; select best type of sand and then control its characteristics; recognize sand defects; use cores of correct green, dry and hot strength and proper strength in the mold; use simple molding technique; use proper venting, melting, pouring and shakeout procedures; have proper inspection and testing procedures and start using them at the time the casting is being designed on paper; insist on proper equipment maintenance, and set up and use an intelligent cost sys-

(*Please turn to page* 264)

*Top*—Speakers panel at the Saturday luncheon meeting concluding the Ohio Regional Conference. *Bottom*—Meeting of the conference committee

# A SOUTHERN SUPPLY H

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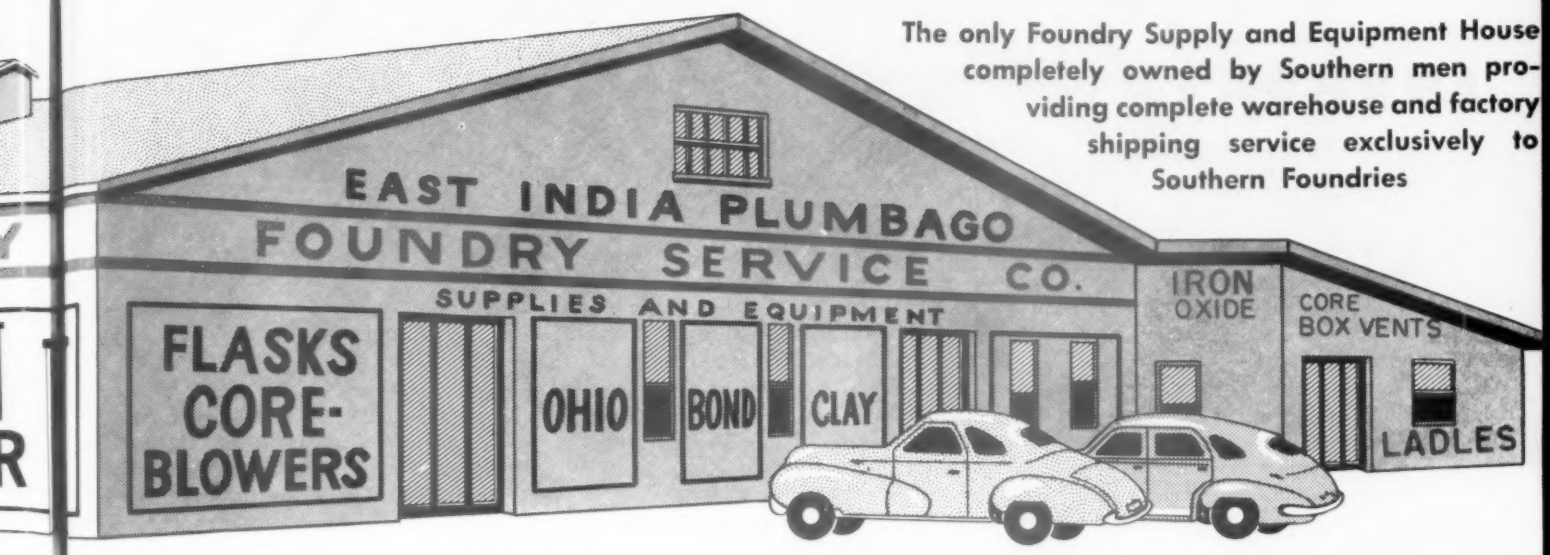


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"WE ALWAYS GIVE GOOD SERVICE"

By EDWIN BREMER

# FOUNDRY Developments

NONFERROUS foundry producing a wide variety of alloys has found that the problem of segregating gates and risers, as well as defective castings, has been simplified greatly by an easily applied procedure which can be used in any foundry with the same problem. Method is to employ copper nails with numbers on the heads which correspond to designations given to the various alloys. The nails are pushed into the tops of the gates and risers while they still are in the mushy state. When they are separated from the castings, all the collector has to do is look at the number on the nailhead to determine in which bin the gate or riser should be placed. Similarly aluminum or steel nails could be employed for aluminum alloy or iron and steel castings.

* * *

RESEARCH department of American Steel & Wire Co. recently installed a new electrical power source for providing energy for either the spark or arc method for quantitatively analyzing steel specimens by the spectrochemical procedure. New source includes the following principles: Small packaged unit to serve as a base for the spectrograph and eliminate a separate source room. An air interrupter which will eliminate high-voltage control and high maintenance costs. An oscillograph mounted in view of the operator so that it is possible to observe excitation conditions at all times so that power output can be reproduced. A source for universal application in emission spectrochemical quantitative analysis.

* * *

MEASUREMENT of thickness of nonmagnetic coatings such as paints, enamels, metal platings, protective coatings, etc., on iron and steel can be determined without damage by a recently developed portable instrument. Instrument head contains a coil connected to a bridge circuit. Coating thickness is measured by the effect of changes in the reluctance of the magnetic circuit. When coil is in direct contact with base metal the reluctance is low and self-inductance of coil is high. Increase in gap between coil and base metal unbalances the bridge, and causes current to flow through the indicating microammeter which shows the thickness in the range 0.0001 to 0.50-in. Readings are claimed to be within 10 per cent of actual thickness.

* * *

Top compression piston ring for automotive use which is claimed to be twice as strong and possess 50 per cent more spring has been developed by one firm. Iron for the rings is melted in high frequency electric furnaces and centrifugally cast in water-cooled molds. Material is a plain iron containing 2.85 to 3.50 per cent TC and 1.0 to 1.65 per cent Si, and poured in the form of sleeves which have a white fracture. Sleeves are heat treated at 1750°F for several hours and air quenched, which results in a structure with large graphite flakes and coarse pearlite.

* * *

MIDWESTERN foundry has found that use of automatic hose reels for air lines employed in blowing off molds, and patterns on molding machines, saves considerable wear and tear on the hoses as well as making them easily accessible to the operators. On one large molding machine two automatic reels are used one on each side, which eliminates the need for pulling the hose across the machine, and permits use of one or both hoses as required.

* * *

EXPERIMENTAL work by and practical experience of E. F. Emley, and reported in the February issue of the *Journal* of the Institute of Metals (British), indicate that the origin of flux inclusions in cast magnesium alloys may arise from the following: Unabsorbed protective flux remaining on the metal surface, particularly around the edges of the pot. Presence of too fluid a flux cover or insufficient care being taken in drawing back the flux cover from the lip of the pot before pouring. Leaving behind insufficient metal in the bottom of the pot at end of pouring. Careless handling of crucible in transferring from furnaces to pouring point; also jerking of the crucible back towards the vertical position after pouring where several castings are poured from one melt. Presence of powdery brittle flux cover due to excessively long heating of metal. Failure to remove encrusted flux from the lip of the pot before pouring. Flux contamination of the molding sand which may give rise to contamination in areas where microporosity reaches the surface.

* * *

PROPRIETARY process used in one foundry for production of gray iron piston ring pots or sleeves by the centrifugal casting method involves use of thin sheets of asbestos paper for lining the metal mold. Paper is 10-lb stock about 0.022-in. thick, and is cut to the exact size so that when inserted into the mold, the edges just butt. Since the pots or sleeves are out-of-round to permit cutting the joint, the paper is located so that the ridge left by the joint indicates the point at which the joint should be cut in the ring.

* * *

AT PRESENT three different materials are being used for patterns in production of investment molded castings. First material used, and probably employed more than any other type, are the waxes of several types compounded to meet various physical requirements. Next addition to the field was the synthetic resin or plastic materials which may be polystyrene, polythene or methyl methacrylate type. Newest pattern material is mercury which is poured into the mold and then placed in a freezer until the mercury solidifies.

* * *

MOUNTING a number of molds on a large electrically driven turntable has enabled one aluminum permanent mold casting firm to obtain uniform operating cycles as well as to secure better production. With this arrangement one man fills the mold, and another opens the mold, removes the casting, and closes the mold. In some cases a third man may spray the mold and close it. Rotation of the turntable may be adjusted to provide any desired operating cycle.

# *Carrying* the HEAVY end of the load

*Logan Roller Conveyors are the basis for most of the material movement in this metal foundry. This view shows pouring lines. After pouring, molds are transferred to the roller-bed transfer car in the foreground which delivers the molds to cooling lines.*

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# TABLES SPEED THE CALCULATION OF BOARD FEET IN PATTERN LUMBER

The accompanying tables, which give the number of board-feet in planks of various sizes, will be found of value to patternmakers and others in calculating the cost of lumber for patterns and flasks. The size of the pieces is given at the left and their length in the various columns across the top of the table.

A board foot contains 144 cubic inches of lumber. That is, a plank 12 inches square and 1 inch thick contains 1 board foot; if it were 2 inches thick, it would contain 2 board feet. However, in selling lumber, dealers always figure boards less than 1 inch thick as if they were inch boards.

TABLE I

Length in Feet

| Size | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Feet Board Measure | | | | | | | | | | | | | |
| 1 x 1 | 0.33 | 0.41 | 0.5 | 0.58 | 0.66 | 0.75 | 0.83 | 0.91 | 1.00 | 1.08 | 1.16 | 1.25 | 1.33 |
| 1 x 2 | 0.66 | 0.82 | 1.0 | 1.16 | 1.32 | 1.50 | 1.66 | 1.82 | 2.00 | 2.16 | 2.32 | 2.50 | 2.66 |
| 1 x 3 | 1.00 | 1.25 | 1.5 | 1.75 | 2.00 | 2.25 | 2.50 | 2.75 | 3.00 | 3.25 | 3.50 | 3.75 | 4.00 |
| 1 x 4 | 1.33 | 1.66 | 2.0 | 2.33 | 2.66 | 3.00 | 3.33 | 3.66 | 4.00 | 4.33 | 4.66 | 5.00 | 5.53 |
| 1 x 5 | 1.66 | 2.08 | 2.5 | 2.91 | 3.33 | 3.75 | 4.16 | 4.58 | 5.00 | 5.41 | 5.83 | 6.25 | 6.66 |
| 1 x 6 | 2.00 | 2.50 | 3.0 | 3.50 | 4.00 | 4.50 | 5.00 | 5.50 | 6.00 | 6.60 | 7.00 | 7.50 | 8.00 |
| 1 x 7 | 2.33 | 2.91 | 3.5 | 4.08 | 4.66 | 5.25 | 5.81 | 6.37 | 7.00 | 7.57 | 8.16 | 8.75 | 9.33 |
| 1 x 8 | 2.66 | 3.33 | 4.0 | 4.66 | 5.33 | 6.00 | 6.66 | 7.33 | 8.00 | 8.66 | 9.33 | 10.00 | 10.66 |
| 1 x 9 | 3.00 | 3.75 | 4.5 | 5.25 | 6.00 | 6.75 | 7.50 | 8.25 | 9.00 | 9.75 | 10.50 | 11.25 | 12.00 |
| 1 x 10 | 3.33 | 4.16 | 5.0 | 5.33 | 6.66 | 7.50 | 8.13 | 9.16 | 10.00 | 10.82 | 11.66 | 12.50 | 13.33 |
| 1 x 11 | 3.66 | 4.58 | 5.5 | 6.11 | 7.33 | 8.25 | 9.16 | 10.08 | 11.00 | 11.90 | 12.82 | 13.75 | 14.66 |
| 1 x 12 | 4.00 | 5.00 | 6.0 | 7.00 | 8.00 | 9.00 | 10.00 | 11.00 | 12.00 | 13.00 | 14.00 | 15.00 | 16.00 |

TABLE II

Length in Feet

| Size | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Feet Board Measure | | | | | | | | | | | | | |
| 1¼ x 1 | 0.41 | 0.52 | 0.62 | 0.73 | 0.83 | 0.93 | 1.04 | 1.14 | 1.25 | 1.35 | 1.45 | 1.56 | 1.66 |
| 1¼ x 2 | 0.83 | 1.04 | 1.25 | 1.45 | 1.66 | 1.87 | 2.08 | 2.28 | 2.50 | 2.70 | 2.91 | 3.12 | 3.33 |
| 1¼ x 3 | 1.24 | 1.56 | 1.87 | 2.18 | 2.50 | 2.81 | 3.12 | 3.43 | 3.75 | 4.05 | 4.37 | 4.68 | 5.00 |
| 1¼ x 4 | 1.66 | 2.08 | 2.50 | 2.91 | 3.32 | 3.75 | 4.16 | 4.57 | 5.00 | 5.41 | 5.82 | 6.25 | 6.66 |
| 1¼ x 5 | 2.08 | 2.60 | 3.12 | 3.64 | 4.16 | 4.63 | 5.20 | 5.72 | 6.25 | 6.76 | 7.28 | 7.81 | 8.32 |
| 1¼ x 6 | 2.50 | 3.12 | 3.75 | 4.37 | 5.00 | 5.62 | 6.25 | 6.87 | 7.50 | 8.10 | 8.75 | 9.37 | 10.00 |
| 1¼ x 7 | 2.91 | 3.64 | 4.38 | 5.10 | 5.83 | 6.56 | 7.29 | 8.01 | 8.75 | 9.47 | 10.20 | 10.93 | 11.66 |
| 1¼ x 8 | 3.32 | 4.16 | 5.00 | 5.82 | 6.65 | 7.50 | 8.32 | 9.15 | 10.00 | 10.82 | 11.66 | 12.50 | 13.32 |
| 1¼ x 9 | 3.75 | 4.66 | 5.62 | 6.56 | 7.50 | 8.43 | 9.37 | 10.29 | 11.25 | 12.18 | 13.12 | 14.05 | 15.00 |
| 1¼ x 10 | 4.16 | 5.20 | 6.25 | 7.27 | 8.33 | 9.57 | 10.30 | 11.54 | 12.50 | 13.52 | 14.55 | 15.62 | 16.64 |
| 1¼ x 11 | 4.58 | 5.72 | 6.87 | 8.01 | 9.17 | 10.31 | 11.45 | 12.60 | 13.75 | 14.88 | 16.03 | 17.18 | 18.35 |
| 1¼ x 12 | 5.00 | 6.25 | 7.50 | 8.75 | 10.00 | 11.25 | 12.50 | 12.75 | 15.00 | 16.25 | 17.50 | 18.75 | 20.00 |

The eight tables published cover a complete range of sizes of lumber ordinarily used in making wood patterns. Table I covers boards 1 inch thick, ranging from 1 to 12 inches in width and from 4 to 16 feet in length, the widths advancing by single inches and the lengths by feet. Table II covers boards 1¼ inches thick, also ranging in width and length from 1 to 12 inches and from 4 to 16 feet. In a similar manner, the subsequent tables cover 1½-inch, 2-inch, 2½-inch, 3-inch, 3½-inch and 4-inch planks.

The number of board feet in planks of odd length, not given in the table, may be found by simple interpolation. For instance, to find the board feet

TABLE III

Length in Feet

| Size | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Feet Board Measure | | | | | | | | | | | | | |
| 1½ x 1 | 0.5 | 0.61 | 0.75 | 0.87 | 1.0 | 1.12 | 1.33 | 1.36 | 1.5 | 1.62 | 1.74 | 1.87 | 2.0 |
| 1½ x 2 | 1.0 | 1.23 | 1.50 | 1.74 | 2.0 | 2.25 | 2.46 | 2.73 | 3.0 | 3.24 | 3.48 | 3.75 | 4.0 |
| 1½ x 3 | 1.5 | 1 84 | 2.25 | 2.61 | 3.0 | 3.37 | 3.75 | 4.13 | 4.5 | 4.86 | 4.72 | 5.62 | 6.0 |
| 1½ x 4 | 2.0 | 2.49 | 3.00 | 3.49 | 4.0 | 4.50 | 4.99 | 5.49 | 6.0 | 6.49 | 6.99 | 7.50 | 8.0 |
| 1½ x 5 | 2.5 | 3.09 | 3.75 | 4.36 | 5.0 | 5.62 | 6.18 | 6.75 | 7.5 | 8.11 | 8.73 | 9.37 | 10.0 |
| 1½ x 6 | 3.0 | 3.75 | 4.50 | 5.25 | 6.0 | 6.75 | 7.50 | 8.25 | 9.0 | 9.75 | 10.50 | 11.25 | 12.0 |
| 1½ x 7 | 3.5 | 4.36 | 5.25 | 6.12 | 7.0 | 7.87 | 8.72 | 9.61 | 10.5 | 11.35 | 12.24 | 13.12 | 14.0 |
| 1½ x 8 | 4.0 | 5.00 | 6.00 | 7.00 | 8.0 | 9.00 | 10.00 | 11.00 | 12.0 | 13.00 | 14.00 | 15.00 | 16.0 |
| 1½ x 9 | 4.5 | 5.43 | 6.75 | 7.87 | 9.0 | 10.12 | 11.25 | 12.37 | 13.5 | 14.62 | 15.74 | 16.87 | 18.0 |
| 1½ x 10 | 5.0 | 6.24 | 7.50 | 8.73 | 10.0 | 11.25 | 12.49 | 13.74 | 15.0 | 16.23 | 17.49 | 18.75 | 20.0 |
| 1½ x 11 | 5.5 | 6.87 | 8.25 | 9.61 | 11.0 | 12.37 | 13.74 | 15.12 | 16.5 | 17.85 | 19.23 | 20.62 | 22.0 |
| 1½ x 12 | 6.0 | 7.50 | 9.00 | 10.50 | 12.0 | 13.50 | 15.00 | 16.50 | 18.0 | 19.50 | 21.00 | 22.50 | 24.0 |

TABLE IV

Length in Feet

| Size | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Feet Board Measure | | | | | | | | | | | | | |
| 2 x 1 | 0.66 | 0.32 | 1.0 | 1.16 | 1.32 | 1.50 | 1.66 | 1.82 | 2.0 | 2.16 | 2.32 | 2.5 | 2.66 |
| 2 x 2 | 1.33 | 1.64 | 2.0 | 2.33 | 2.64 | 3.00 | 3.33 | 3.64 | 4.0 | 4.33 | 4.64 | 5.0 | 5.33 |
| 2 x 3 | 2.00 | 2.50 | 3.0 | 3.50 | 4.00 | 4.50 | 5.00 | 5.50 | 6.0 | 6.50 | 7.00 | 7.5 | 8.00 |
| 2 x 4 | 2.66 | 3.33 | 4.0 | 4.66 | 5.33 | 6.00 | 6.66 | 7.33 | 8.0 | 8.66 | 9.33 | 10.0 | 10.66 |
| 2 x 5 | 3.33 | 4.16 | 5.0 | 5.82 | 6.66 | 7.50 | 8.33 | 9.16 | 10.0 | 10.82 | 11.66 | 12.5 | 13.33 |
| 2 x 6 | 4.00 | 5.00 | 6.0 | 7.00 | 8.00 | 9.00 | 10.00 | 11.00 | 12.0 | 13.00 | 14.00 | 15.0 | 16.00 |
| 2 x 7 | 4.66 | 5.82 | 7.0 | 8.16 | 9.33 | 10.50 | 11.62 | 12.74 | 14.0 | 15.14 | 16.33 | 17.5 | 18.66 |
| 2 x 8 | 5.33 | 6.66 | 8.0 | 9.33 | 10.66 | 12.00 | 13.33 | 14.66 | 16.0 | 17.33 | 18.66 | 20.0 | 21.33 |
| 2 x 9 | 6.00 | 7.50 | 9.0 | 10.50 | 12.00 | 13.50 | 15.00 | 16.50 | 18.0 | 19.50 | 21.00 | 22.5 | 24.00 |
| 2 x 10 | 6.66 | 8.33 | 10.0 | 11.66 | 13.33 | 15 00 | 16.66 | 18.33 | 20.0 | 21.64 | 23.33 | 25.0 | 26.66 |
| 2 x 11 | 7.33 | 9.16 | 11.0 | 12.82 | 14.66 | 16.50 | 18.33 | 20.16 | 22.0 | 23.80 | 25.64 | 27.5 | 29.33 |
| 2 x 12 | 8.00 | 10.00 | 12.0 | 14.00 | 16.00 | 18.00 | 20.00 | 22.00 | 24.0 | 26.00 | 28.00 | 30.0 | 32.00 |

# TABLES SPEED THE CALCULATION OF BOARD FEET IN PATTERN LUMBER

in a plank 1½ inches thick, 5 inches wide and 10 feet 3 inches long, we first turn to the 1½-inch table (Table III). On the line opposite 1½ x 5, under 10 feet, we find 6.18 board feet and under 11 feet, 6.75 board feet. The difference is 0.57 board feet. Now 10 feet 3 inches is equivalent to 10¼ feet. Therefore, divide 0.57 by 4 and add the product, 0.142, to 6.18, giving 6.322 board feet in a plank 1½ x 5 x 10¼.

If neither the width nor the length is given exactly in the table, a double interpolation is necessary; and if extreme accuracy is desired, a triple interpolation may be required if the exact thickness is not in the table.

The tables should be used with judgment. That is, do not take the trouble to make a lengthy interpolation, when the accuracy of the final result, in money, would not be changed over one cent. In most cases sufficient accuracy is attained by taking the nearest even dimensions given in the table without further calculation.

TABLE V

Length in Feet

| Size | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Feet Board Measure | | | | | | | | | | | | | |
| 1½ x 1 | 0.82 | 1.08 | 1.25 | 1.50 | 1.66 | 1.88 | 2.08 | 2.25 | 2.5 | 2.75 | 2.88 | 3.16 | 3.33 |
| 1½ x 2 | 1.66 | 2.03 | 2.50 | 2.88 | 3.33 | 3.75 | 4.16 | 4.58 | 5.0 | 5.40 | 5.80 | 6.25 | 6.66 |
| 1½ x 3 | 2.50 | 3.25 | 3.75 | 4.38 | 5.00 | 5.63 | 6.25 | 6.88 | 7.5 | 8.25 | 8.75 | 9.38 | 10.00 |
| 1½ x 4 | 3.33 | 4.16 | 5.00 | 5.80 | 7.50 | 8.00 | 8.33 | 9.16 | 10.0 | 10.80 | 11.66 | 12.50 | 13.33 |
| 1½ x 5 | 4.08 | 5.25 | 6.25 | 7.33 | 8.33 | 9.40 | 10.40 | 11.50 | 12.5 | 13.56 | 14.56 | 15.66 | 16.66 |
| 1½ x 6 | 5.00 | 6.25 | 7.50 | 8.75 | 10.00 | 11.25 | 12.50 | 13.75 | 15.0 | 16.25 | 17.50 | 18.75 | 20.00 |
| 1½ x 7 | 5.80 | 7.33 | 8.75 | 10.16 | 11.66 | 13.16 | 15.00 | 16.28 | 17.5 | 18.75 | 20.40 | 21.88 | 23.33 |
| 1½ x 8 | 6.66 | 8.33 | 10.00 | 11.66 | 13.33 | 15.00 | 16.66 | 18.33 | 20.0 | 21.66 | 23.33 | 25.00 | 26.66 |
| 1½ x 9 | 7.50 | 9.40 | 11.25 | 13.16 | 15.00 | 16.88 | 18.75 | 20.66 | 22.5 | 24.33 | 26.25 | 28.08 | 30.00 |
| 1½ x 10 | 8.33 | 10.40 | 12.50 | 14.56 | 16.66 | 18.75 | 20.80 | 23.08 | 25.0 | 27.08 | 29.16 | 31.25 | 33.33 |
| 1½ x 11 | 9.16 | 11.50 | 13.75 | 16.08 | 18.33 | 20.66 | 23.00 | 25.25 | 27.5 | 29.82 | 32.16 | 34.50 | 36.66 |
| 1½ x 12 | 10.00 | 12.50 | 15.00 | 17.50 | 20.00 | 22.50 | 25.00 | 27.50 | 30.0 | 32.50 | 35.00 | 37.50 | 40.00 |

TABLE VI

Length in Feet

| Size | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Feet Board Measure | | | | | | | | | | | | | |
| 3 x 1 | 1.0 | 1.25 | 1.5 | 1.75 | 2.0 | 2.25 | 2.5 | 2.75 | 3.0 | 3.25 | 3.5 | 3.75 | 4.0 |
| 3 x 2 | 2.0 | 2.50 | 3.0 | 3.50 | 4.0 | 4.50 | 5.0 | 5.50 | 6.0 | 6.50 | 7.0 | 7.50 | 8.0 |
| 3 x 3 | 3.0 | 3.75 | 4.5 | 5.25 | 6.0 | 6.75 | 7.5 | 8.25 | 9.0 | 9.75 | 10.5 | 11.25 | 12.0 |
| 3 x 4 | 4.0 | 5.00 | 6.0 | 7.00 | 8.0 | 9.00 | 10.0 | 11.0 | 12.0 | 13.00 | 14.0 | 15.00 | 16.0 |
| 3 x 5 | 5.0 | 6.25 | 7.5 | 8.75 | 10.0 | 11.25 | 12.5 | 13.75 | 15.0 | 16.25 | 17.5 | 18.75 | 20.0 |
| 3 x 6 | 6.0 | 7.50 | 9.0 | 10.50 | 12.0 | 13.50 | 15.0 | 16.50 | 18.0 | 19.50 | 21.0 | 22.50 | 24.0 |
| 3 x 7 | 7.0 | 8.75 | 10.5 | 12.25 | 14.0 | 15.75 | 17.5 | 19.25 | 21.0 | 22.75 | 24.5 | 26.25 | 28.0 |
| 3 x 8 | 8.0 | 10.00 | 12.0 | 14.00 | 16.0 | 18.00 | 20.0 | 22.00 | 24.0 | 26.00 | 28.0 | 30.00 | 32.0 |
| 3 x 9 | 9.0 | 11.25 | 13.5 | 15.75 | 18.0 | 20.25 | 22.5 | 24.75 | 27.0 | 29.25 | 31.5 | 33.25 | 36.0 |
| 3 x 10 | 10.0 | 12.50 | 15.0 | 17.50 | 20.0 | 22.50 | 25.0 | 27.50 | 30.0 | 32.50 | 35.0 | 37.50 | 40.0 |
| 3 x 11 | 11.0 | 13.75 | 16.5 | 20.25 | 22.0 | 24.75 | 27.5 | 30.25 | 33.0 | 35.75 | 38.5 | 41.25 | 44.0 |
| 3 x 12 | 12.0 | 15.00 | 18.0 | 21.00 | 24.0 | 27.00 | 30.0 | 33.00 | 36.0 | 39.00 | 42.0 | 45.00 | 48.0 |

TABLE VII

Length in Feet

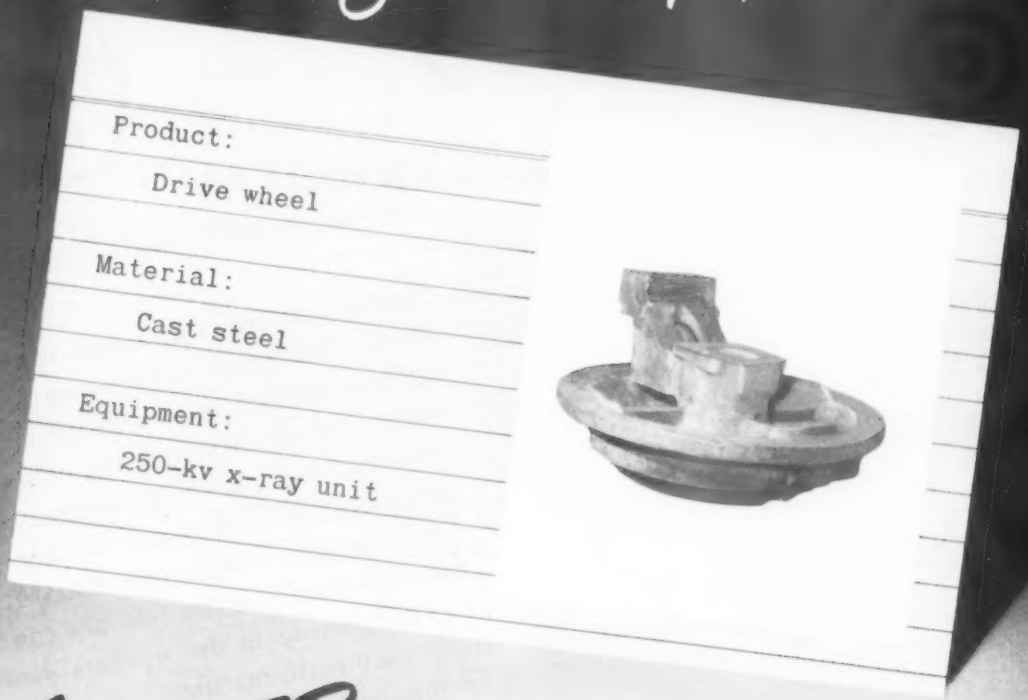
| Size | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Feet Board Measure | | | | | | | | | | | | | |
| 3½ × 1 ... | 1.17 | 1.46 | 1.75 | 2.04 | 2.33 | 2.63 | 2.92 | 3.21 | 3.50 | 3.79 | 4.08 | 4.37 | 4.66 |
| 3½ × 2 ... | 2.33 | 2.92 | 3.50 | 4.08 | 4.66 | 5.25 | 5.83 | 6.41 | 7.00 | 7.58 | 8.16 | 8.75 | 9.33 |
| 3½ × 3 ... | 3.50 | 4.37 | 5.25 | 6.12 | 7.00 | 7.87 | 8.75 | 9.62 | 10.50 | 11.37 | 12.25 | 13.12 | 14.00 |
| 3½ × 4 ... | 4.66 | 5.83 | 7.00 | 8.16 | 9.33 | 10.50 | 11.66 | 12.83 | 13.99 | 15.16 | 16.33 | 17.49 | 18.66 |
| 3½ × 5 ... | 5.83 | 7.29 | 8.75 | 10.20 | 11.66 | 13.12 | 14.58 | 16.04 | 17.49 | 18.95 | 20.41 | 21.87 | 23.32 |
| 3½ × 6 ... | 7.00 | 8.75 | 10.50 | 12.25 | 13.99 | 15.74 | 17.49 | 19.24 | 20.99 | 22.74 | 24.49 | 26.24 | 27.99 |
| 3½ × 7 ... | 8.16 | 10.20 | 12.25 | 14.29 | 16.33 | 18.37 | 20.41 | 22.45 | 24.49 | 26.53 | 28.57 | 30.61 | 32.65 |
| 3½ × 8 ... | 9.33 | 11.66 | 13.99 | 16.33 | 18.66 | 20.99 | 23.32 | 25.66 | 28.00 | 30.32 | 32.65 | 34.99 | 37.32 |
| 3½ × 9 ... | 10.50 | 13.12 | 15.95 | 18.37 | 20.99 | 23.62 | 26.24 | 28.86 | 31.49 | 34.11 | 36.74 | 39.36 | 41.98 |
| 3½ × 10 .. | 11.66 | 14.58 | 17.49 | 20.41 | 23.32 | 26.24 | 29.16 | 32.07 | 34.99 | 37.90 | 40.82 | 43.73 | 46.65 |
| 3½ × 11 .. | 12.83 | 16.04 | 19.23 | 22.45 | 25.66 | 28.86 | 32.07 | 35.28 | 38.48 | 41.69 | 44.90 | 48.11 | 51.31 |
| 3½ × 12 .. | 13.99 | 17.49 | 20.99 | 22.49 | 27.99 | 31.49 | 34.99 | 38.48 | 41.98 | 45.49 | 48.98 | 52.48 | 55.98 |

TABLE VIII

Length in Feet

| Size | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Feet Board Measure | | | | | | | | | | | | | |
| 4 x 1 | 1.33 | 1.66 | 2.0 | 2.33 | 2.66 | 3.0 | 3.33 | 3.66 | 4.0 | 4.33 | 4.66 | 5.0 | 5.33 |
| 4 x 2 | 2.66 | 3.33 | 4.0 | 4.66 | 5.33 | 6.0 | 6.66 | 7.33 | 8.0 | 8.66 | 9.33 | 10.0 | 10.66 |
| 4 x 3 | 4.00 | 5.00 | 6.0 | 7.00 | 8.00 | 9.0 | 10.00 | 11.00 | 12.0 | 13.00 | 14.00 | 15.0 | 16.00 |
| 4 x 4 | 5.33 | 6.66 | 8.0 | 9.33 | 10.66 | 12.0 | 13.33 | 14.66 | 16.0 | 17.33 | 18.66 | 20.0 | 21.33 |
| 4 x 5 | 6.66 | 8.33 | 10.0 | 11.66 | 13.33 | 15.0 | 16.66 | 18.33 | 20.0 | 21.66 | 23.33 | 25.0 | 26.66 |
| 4 x 6 | 8.00 | 10.00 | 12.0 | 14.00 | 16.00 | 18.0 | 20.00 | 22.00 | 24.0 | 26.00 | 28.00 | 30.0 | 32.00 |
| 4 x 7 | 9.33 | 11.66 | 14.0 | 16.33 | 18.66 | 21.0 | 23.33 | 25.66 | 28.0 | 30.33 | 32.66 | 35.0 | 37.33 |
| 4 x 8 | 10.66 | 13.33 | 16.0 | 18.66 | 21.33 | 24.0 | 26.66 | 29.33 | 32.0 | 34.66 | 37.33 | 40.0 | 42.66 |
| 4 x 9 | 12.00 | 15.00 | 18.0 | 21.00 | 24.00 | 27.0 | 30.00 | 33.00 | 36.0 | 39.00 | 42.00 | 45.0 | 48.00 |
| 4 x 10 | 13.33 | 16.66 | 20.0 | 23.33 | 26.66 | 30.0 | 33.33 | 36.66 | 40.0 | 43.33 | 46.66 | 50.0 | 53.33 |
| 4 x 11 | 14.66 | 18.33 | 22.0 | 25.66 | 29.33 | 33.0 | 36.66 | 40.33 | 44.0 | 47.66 | 51.33 | 55.0 | 58.66 |
| 4 x 12 | 16.00 | 20.00 | 24.0 | 28.00 | 32.00 | 36.0 | 40.00 | 44.00 | 48.0 | 52.00 | 56.00 | 60.0 | 64.00 |

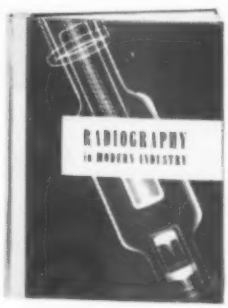
# What's the right X-Ray film?




# ANSWER:

## KODAK INDUSTRIAL X-RAY FILM, TYPE F

Because the equipment had only moderate power and section thicknesses up to 3¼ inches were to be examined, the radiographer chose Kodak Industrial X-ray Film, Type F, exposed with Kodak Industrial X-ray Intensifying Screens. This film is designed for use with fluorescent screens to provide maximum speed. The combination is essential in boosting equipment capacity to handle a heavy job like this. And, since the examination is for gross defects, speed is more important than sensitivity to very fine detail.

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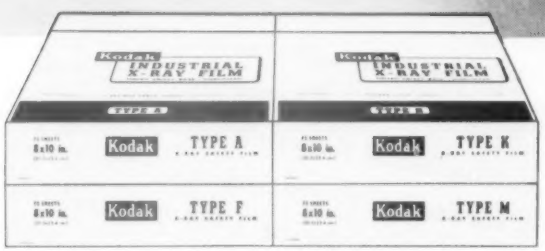


### A TYPE OF FILM FOR EVERY PROBLEM

To provide the recording medium best suited to any combination of radiographic factors, Kodak produces four types of industrial x-ray film.

**Type F** gives the highest available speed and contrast when exposed with calcium tungstate intensifying screens. Has wide latitude with either x-rays or gamma rays, exposed directly or with lead screens.

**Type M** provides high contrast and exceptional detail under direct exposure or with lead-foil screens. It has extra-fine grain, and speed is adequate for radiography of light alloys at moderate kilovoltages and for much million-volt work.

**Type A** offers high contrast with about three times the speed of Type M, but with slightly more graininess. Used direct or with lead-foil screens for study of light alloys at lower kilovoltages, and of heavier steel parts at 1,000 kv and with gamma rays.

**Type K** has medium contrast with high speed. For gamma ray and x-ray work where highest possible speed is needed at available kilovoltage without use of intensifying screens.

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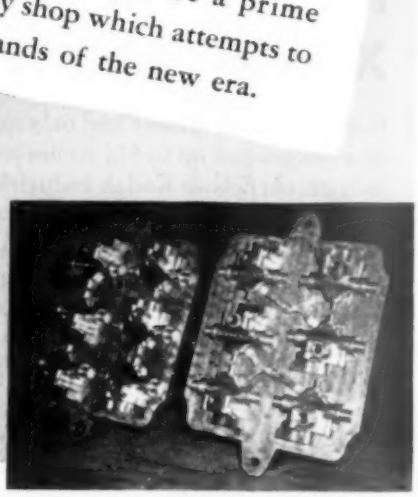

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# FOUNDRY Statistics

## Index of Foundry Equipment Orders

**Foundry Trades Only**

(Net Orders Closed, New Equipment)

| | 1948 | 1949 |
|---|---|---|
| Jan. | 380.9 | 149.9 |
| Feb. | 367.3 | 144.4 |
| Mar. | 326.2 | .... |
| Apr. | 412.0 | .... |
| May | 388.5 | .... |
| June | 376.8 | .... |
| July | 456.3 | .... |
| Aug. | 324.7 | .... |
| Sept. | 273.5 | .... |
| Oct. | 296.0 | .... |
| Nov. | 284.4 | .... |
| Dec. | 243.7 | .... |

Note: Figures are percentages of the base period 1937-1939 taken as 100 per cent (monthly average). Source: Foundry Equipment Manufacturers Association.

## Foundry Production Workers

ESTIMATED NUMBER:

| Type Foundry | Dec. 1948 | Nov. 1948 | Dec. 1947 |
|---|---|---|---|
| Gray Iron | 113,100 | 115,500 | 119,800 |
| Malleable Iron | 39,000 | 38,600 | 37,600 |
| Steel | 74,900 | 75,100 | 70,500 |
| AVERAGE WEEKLY EARNINGS: | | | |
| Gray Iron | $58.88 | $58.45 | $58.16 |
| Malleable Iron | 61.49 | 60.71 | 59.18 |
| Steel | 63.79 | 63.92 | 60.05 |
| AVERAGE WEEKLY HOURS: | | | |
| Gray Iron | 40.0 | 39.8 | 42.5 |
| Malleable Iron | 40.1 | 39.9 | 41.8 |
| Steel | 41.2 | 41.3 | 41.6 |

Source: Bureau of Labor Statistics. Estimates number of foundry production workers adjusted to Federal Security Agency data through 1945.

## Castings Production

In Philadelphia Federal Reserve District

(February, 1949)

| Type | Percentage Change From Jan., 1949 | Feb., 1948 |
|---|---|---|
| Gray Iron | — 5.4 | —11.2 |
| Malleable Iron | —30.3 | —24.1 |
| Steel | +12.3 | +19.6 |
| Nonferrous | +23.0 | — 1.4 |

Source: University of Pennsylvania.

# Shipments of Castings

(Reported by Bureau of the Census)

## Gray Iron Castings

(Net tons)

| | Shipments—Total | Shipments—For Sale | Unfilled *Orders |
|---|---|---|---|
| 1947 | | | |
| Oct. | 1,154,192 | 654,426 | 2,668,781 |
| Nov. | 1,020,239 | 561,660 | 2,687,244 |
| Dec. | 1,066,211 | 587,933 | 2,782,236 |
| Total | 12,540,960 | 7,181,299 | ..... |
| 1948 | | | |
| Jan. | 1,064,335 | 584,238 | 2,802,685 |
| Feb. | 1,024,450 | 571,406 | 2,769,408 |
| Mar. | 1,169,085 | 659,821 | 2,726,415 |
| Apr. | 1,051,083 | 584,969 | 2,690,893 |
| May | 992,692 | 555,728 | 2,601,626 |
| June | 1,072,040 | 597,624 | 2,587,081 |
| July | 914,464 | 490,359 | 2,601,084 |
| Aug. | 1,050,948 | 597,678 | 2,598,789 |
| Sept. | 1,088,051 | 615,978 | 2,587,385 |
| Oct. | 1,148,422 | 642,485 | 2,522,831 |
| Nov. | 1,099,827 | 606,380 | 2,406,737 |
| Dec. | 1,110,512 | 624,739 | 2,284,348 |
| Total | 12,785,909 | 7,131,405 | ..... |
| 1949 | | | |
| Jan. | 1,040,343 | 573,164 | 2,064,861 |

## Steel Castings

(Net tons)

| | Shipments—Total | Shipments—For Sale | Unfilled *Orders |
|---|---|---|---|
| 1947 | | | |
| Oct. | 148,358 | 111,288 | 497,344 |
| Nov. | 130,125 | 97,143 | 493,309 |
| Dec. | 148,124 | 110,970 | 489,364 |
| Total | 1,625,055 | 1,203,504 | ..... |
| 1948 | | | |
| Jan. | 141,068 | 108,282 | 491,745 |
| Feb. | 142,434 | 107,762 | 497,097 |
| Mar. | 162,891 | 125,550 | 508,822 |
| Apr. | 150,305 | 114,896 | 472,370 |
| May | 143,337 | 111,616 | 482,531 |
| June | 152,894 | 117,794 | 469,973 |
| July | 120,445 | 87,927 | 497,410 |
| Aug. | 140,223 | 107,538 | 472,481 |
| Sept. | 149,222 | 112,551 | 447,972 |
| Oct. | 152,983 | 114,819 | 424,460 |
| Nov. | 146,835 | 110,275 | 395,013 |
| Dec. | 157,395 | 116,285 | 354,458 |
| Total | 1,760,032 | 1,335,295 | ..... |
| 1949 | | | |
| Jan. | 140,577 | 103,503 | 338,889 |

## Malleable Iron Castings

(Net tons)

| | Shipments—Total | Shipments—For Sale | Unfilled *Orders |
|---|---|---|---|
| 1947 | | | |
| Nov. | 72,111 | 39,969 | 206,510 |
| Dec. | 77,757 | 44,042 | 202,408 |
| Total | 895,054 | 513,228 | ..... |
| 1948 | | | |
| Jan. | 77,927 | 45,788 | 205,859 |
| Feb. | 75,225 | 42,670 | 209,447 |
| Mar. | 86,767 | 50,065 | 203,351 |
| Apr. | 80,602 | 46,034 | 199,578 |
| May | 76,078 | 42,338 | 191,553 |
| June | 81,747 | 48,170 | 178,760 |
| July | 64,995 | 35,018 | 180,421 |
| Aug. | 73,272 | 41,201 | 176,824 |
| Sept. | 77,815 | 43,985 | 164,002 |
| Oct. | 81,761 | 44,305 | 158,351 |
| Nov. | 77,194 | 42,241 | 146,422 |
| Dec. | 79,882 | 43,397 | 137,385 |
| Total | 933,265 | 525,212 | ..... |
| 1949 | | | |
| Jan. | 71,876 | 38,040 | 126,393 |
| Feb. | 66,744 | 35,074 | 118,318 |

## Aluminum Castings

(Thousands of pounds)

| | Shipments—Total | Shipments—Sand | Shipments—Perm. Mold | Unfilled *Orders |
|---|---|---|---|---|
| 1947 | | | | |
| Oct. | 40,532 | 13,855 | 15,685 | 85,012 |
| Nov. | 34,683 | 11,428 | 13,558 | 83,975 |
| Dec. | 37,489 | 12,552 | 13,784 | 81,784 |
| Total | 441,996 | 155,112 | 174,515 | ..... |
| 1948 | | | | |
| Jan. | 37,889 | 12,670 | 15,020 | 86,176 |
| Feb. | 37,963 | 12,177 | 15,055 | 88,032 |
| Mar. | 41,794 | 13,343 | 16,258 | 78,344 |
| Apr. | 38,269 | 12,407 | 14,563 | 78,499 |
| May | 33,868 | 11,854 | 12,351 | 75,219 |
| June | 35,822 | 12,296 | 13,239 | 72,930 |
| July | 28,944 | 9,851 | 10,504 | 70,321 |
| Aug. | 32,136 | 9,883 | 13,174 | 68,334 |
| Sept. | 35,877 | 11,822 | 13,353 | 66,773 |
| Oct. | 35,542 | 11,733 | 13,216 | 65,538 |
| Nov. | 34,550 | 11,410 | 13,012 | 63,767 |
| Dec. | 31,836 | 10,335 | 11,589 | 59,154 |
| Total | 424,490 | 139,781 | 161,334 | ..... |
| 1949 | | | | |
| Jan. | 29,142 | 9,702 | 10,386 | 55,580 |

## Copper-base Alloy Castings

(Thousands of pounds)

| | Shipments—Total | Shipments—Sand | Shipments—Perm. Mold | Unfilled *Orders |
|---|---|---|---|---|
| 1947 | | | | |
| Oct. | 92,119 | 83,592 | 4,763 | 67,280 |
| Nov. | 81,803 | 74,274 | 3,773 | 73,851 |
| Dec. | 87,215 | 79,495 | 4,393 | 74,814 |
| Total | 1,051,742 | 960,732 | 51,139 | ..... |
| 1948 | | | | |
| Jan. | 85,432 | 77,433 | 4,593 | 74,579 |
| Feb. | 87,169 | 79,329 | 4,509 | 71,143 |
| Mar. | 96,344 | 87,249 | 5,261 | 70,544 |
| Apr. | 89,035 | 80,426 | 4,705 | 70,726 |
| May | 81,286 | 72,982 | 4,910 | 65,818 |
| June | 84,817 | 76,241 | 5,148 | 64,149 |
| July | 71,803 | 64,389 | 4,670 | 66,014 |
| Aug. | 81,976 | 73,947 | 5,018 | 69,126 |
| Sept. | 86,973 | 78,830 | 4,999 | 66,574 |
| Oct. | 91,311 | 82,463 | 5,293 | 62,571 |
| Nov. | 86,497 | 77,751 | 5,107 | 60,892 |
| Dec. | 88,182 | 79,750 | 4,796 | 53,671 |
| Total | 1,030,825 | 930,790 | 59,009 | ..... |
| 1949 | | | | |
| Jan. | 76,348 | 68,379 | 4,593 | 48,124 |

## Magnesium Castings

(Thousands of pounds)

| | Shipments—Total | Shipments—For Sale | Unfilled *Orders |
|---|---|---|---|
| 1947 | | | |
| Oct. | 616 | 560 | 2,659 |
| Nov. | 602 | 545 | 2,808 |
| Dec. | 669 | 587 | 2,730 |
| Total | 7,693 | 7,050 | .... |
| 1948 | | | |
| Jan. | 659 | 597 | 2,701 |
| Feb. | 655 | 591 | 2,866 |
| Mar. | 704 | 625 | 2,741 |
| Apr. | 673 | 605 | 2,640 |
| May | 622 | 542 | 2,673 |
| June | 709 | 624 | 2,712 |
| July | 554 | 521 | 2,684 |
| Aug. | 703 | 655 | 2,834 |
| Sept. | 745 | 700 | 3,206 |
| Oct. | 708 | 650 | 3,070 |
| Nov. | 728 | 683 | 3,416 |
| Dec. | 754 | 695 | 3,455 |
| Total | 8,214 | 7,488 | .... |
| 1949 | | | |
| Jan. | 822 | 761 | 3,821 |

# THIS NEW OSBORN ROTA-LIFT ELIMINATES LIFT OPERATIONS

## OSBORN ROTA-LIFT

The *first* major improvement in match-plate moulding machines in over 30 years!

**ROTA-LIFT**
**jolts**
**rolls**
**squeezes**
**draws**
**closes**

Patent No. 2,012,478
other patents pending.

THE OSBORN MANUFACTURING COMPANY
5401 Hamilton Avenue — Cleveland, Ohio

# MOULDING MACHINE ...SAVES LABOR!

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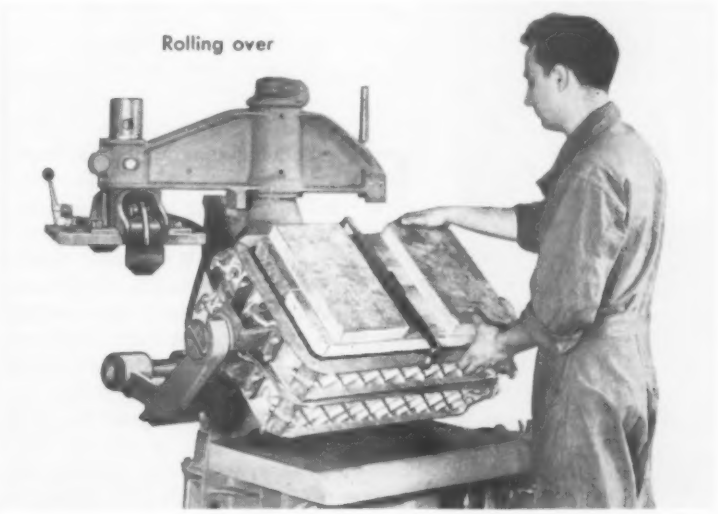
THIS is *Rota-Lift*... Osborn's *new mechanized* Match-Plate Moulding Machine! Rota-Lift and *only* Rota-Lift will perform the following operations mechanically—*rollover, draw* and *close*—in *addition* to conventional jolting and squeezing. These exclusive Rota-Lift features will conserve the physical energies of moulders and make your foundry a better place in which to work.

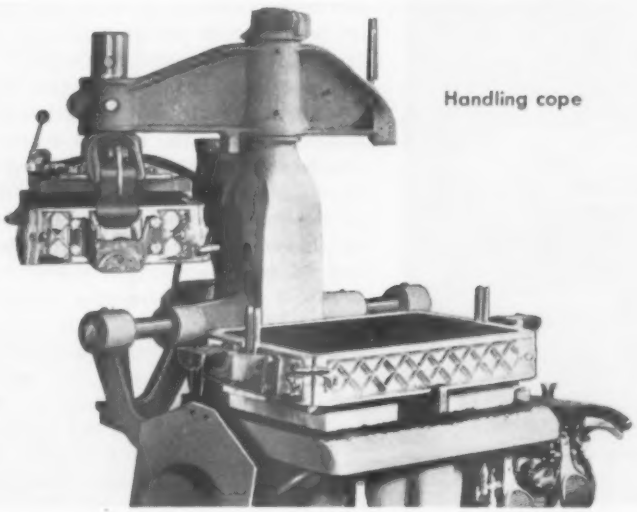
With the fatigue factor reduced to a minimum, production is increased and operation costs reduced accordingly. And for the first time, machine moulding using large match-plate patterns is practical on short runs, or you can increase the number of castings per mould on your present squeezer work.

Contact us today for complete details on *Rota-Lift*—the first major improvement in match-plate moulding machines in 30 years! **See Osborn's representative at the Convention.**



Rolling over

Drawing cope



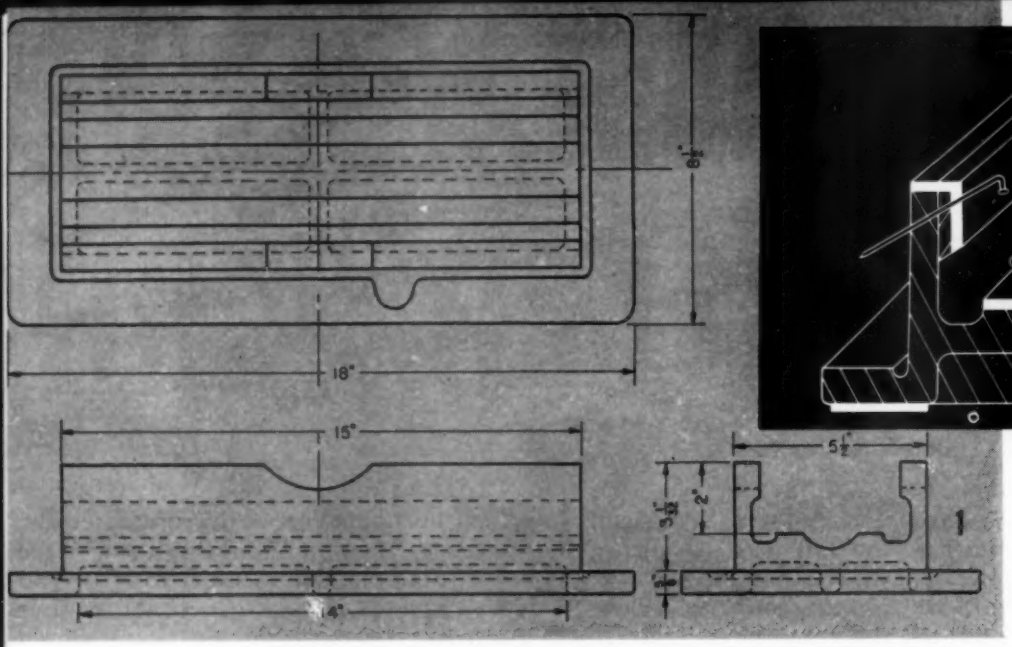
Handling cope

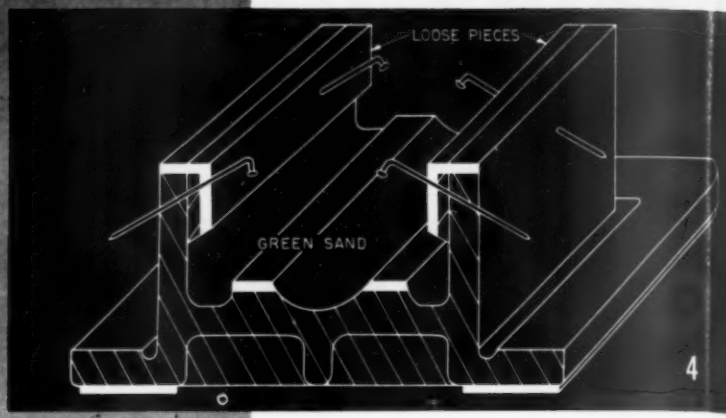
Closing

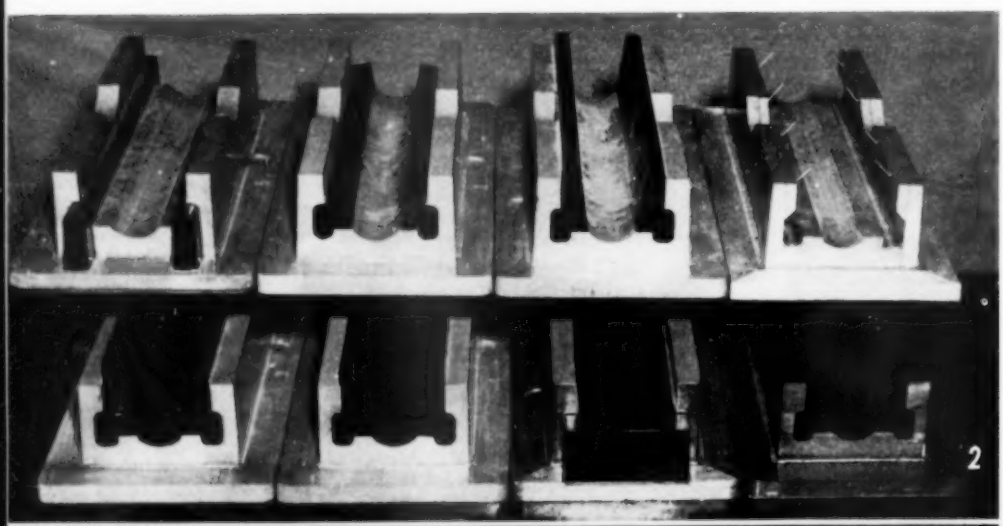
**OSBORN**®

MOULDING MACHINES CORE BLOWING MACHINES

MANUFACTURER'S ASSOCIATION, INC. FOUNDRY EQUIPMENT



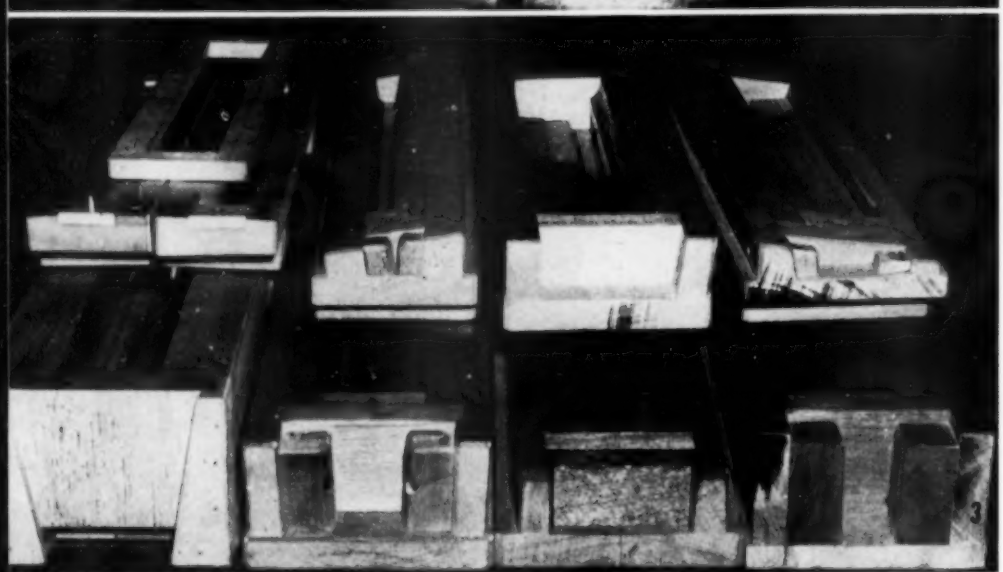




Fig. 1—Sketch of a planing jig, subject of the 1949 AFS patternmaking contest for apprentices. Figs. 2 and 3—Patterns and coreboxes, respectively, submitted in apprentice contest held by Pattern Manufacturers Group of the Associated Industries of Cleveland. Figs. 4 to 9—Sketches indicating features of various patterns

# You

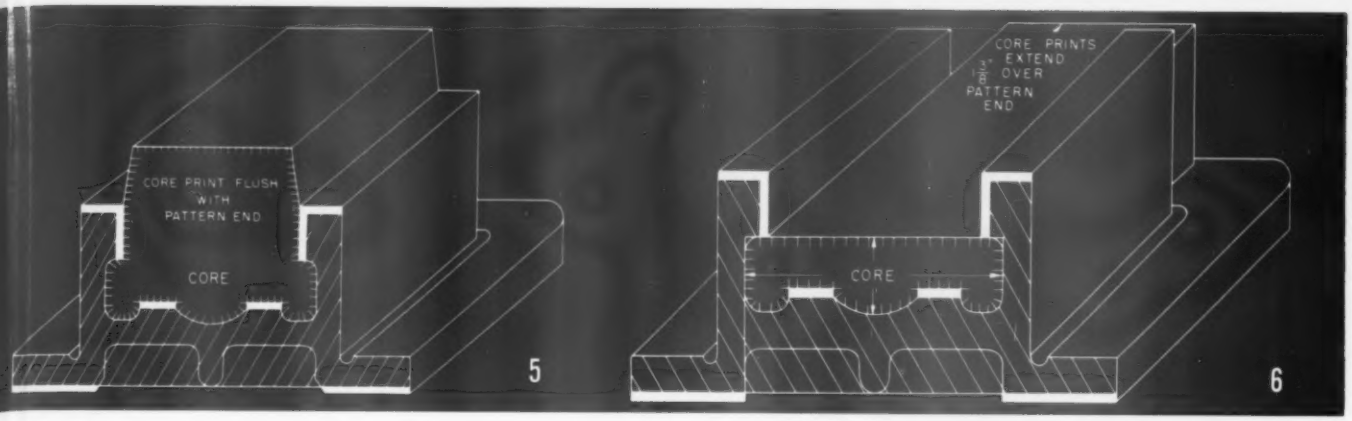
By FRANK C. CECH
Cleveland Trade School
Cleveland

EACH year the number of men who gather about the AFS patternmaking contest entries at the national convention seems to grow. Standing at the fringe of the crowd and listening to the comments being made is not only interesting but also educational. The listener will acquire an insight into the reasoning process that is responsible for the choice of moldability of the pattern.

If it were possible to record the remarks made by the critical audience we would have the basis for an interesting article or panel discussion on how or how not to mold the pattern, gate and riser it, or pour and clean it to increase production, eliminate scrap castings or improve their quality. Thus, the contest of an apprentice stimulates the thinking and provokes the expression of opinions of the master craftsman. The scope of the contest is broadened enhancing its value.

Fig. 1 is a line drawing of the jig chosen for the 1949 AFS patternmaking contest. Other sketches present choices in moldability as expressed by the apprentices who submitted their entries in the 1949 patternmaking apprentice contest held by the Pattern Manufacturers Group of the Associated Industries of Cleveland.

The following suggestions are made to those interested in the contest. Analyze the jig on the drawing for moldability possibilities, critically




# Pick the Winner!

evaluate the pattern discussed in this article, and pick from them the first three choices you consider most practical. Compare your choices with those picked by the judges of the national contest at St. Louis. Note your agreement or disagreement with the national winners.

Of course, the points acquired through accuracy, time and workmanship may win or lose the contest by overshadowing those awarded for moldability, but the points scored for moldability by the national judges are available from AFS headquarters. A direct comparison may thus be made. Provincialism in choice of moldability and pattern construction may be noted when localities that are in competition represent different parts of the country or other countries. This would be due to type of work handled in the respective localities and in the degree of progress made in pattern construction because of newer methods, materials and supplies.

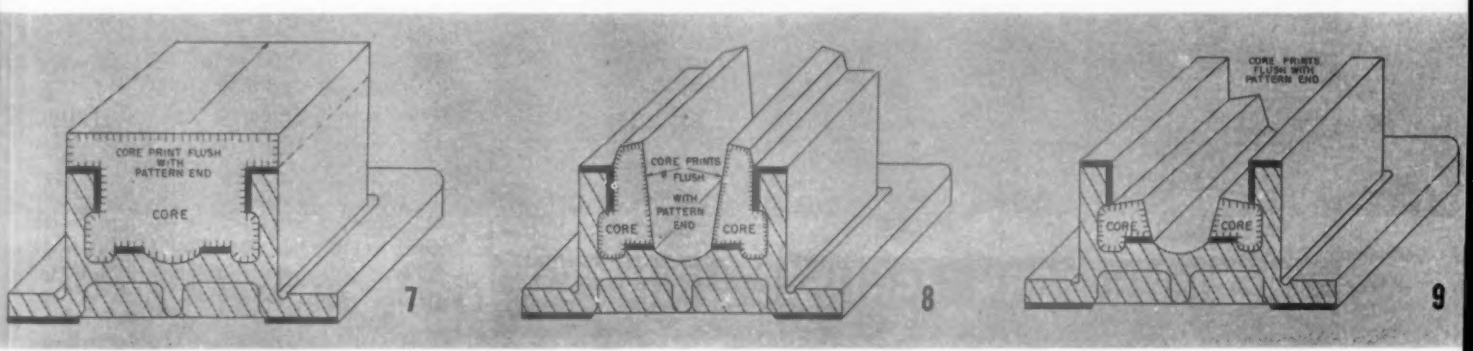
The patterns in Fig. 2 have been assembled so as to permit a close and direct comparison of one to the other. The eye can better evaluate the advantages and disadvantages of each in turn when they are so placed. Considerations of comparison may include, (a) merits of green and dry sand molding, (b) ease of core setting, (c) sufficiency of core support, (d) possibility of core being raised by incoming metal, (e) probability of core tipping, (f) necessity of fastening of core by molder, (g) provision of crushing strips. Others, no doubt, can be added as a critical inspection is made. These considerations represent not only a saving in time but also the elimination or reduction of number of scrap castings due to defects caused by the foregoing.

The coreboxes in Fig. 3 have been placed in relative positions for scrutinizing and comparison. They are well made in the point of wear. The first corebox at the left on the bottom row is an exception to this as the ends have the grain running at right angle to what it should be. Its construction at this point is also weak.

Methods of corebox construction include: (a) a full dump corebox, (b) a parted or split corebox that has too many loose pieces requiring much time in re-assembly, (c) a parted or split corebox requiring booking and the use of a bed-in box for drying, (d) the use of stiles in the corebox to allow easy core dumping without tapering sides due to the allowance of draft, (e) a half dump corebox necessitating the pasting of the core. All but the two coreboxes on the right in the upper row are mates to the pattern shown in Fig. 2.

Note! Looking at the accompanying sketches upside down will put the pattern in the same position that the cores will be set in the mold.

The sketch in Fig. 4 illustrates the green sand molding principle. The strips held in place by the nails (incidentally the nails are better than wood dowels as they do not absorb and consequently swell with moisture) are left in the mold after the pattern is withdrawn. They are then drawn back by the molder into the impression left by the wall of metal to which they were originally attached. It is impractical to remove them in this case; in fact, it is al-



# 20 Manpower Capacity with Automatic Discharge

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**COMBS GYRATORY FOUNDRY RIDDLES**

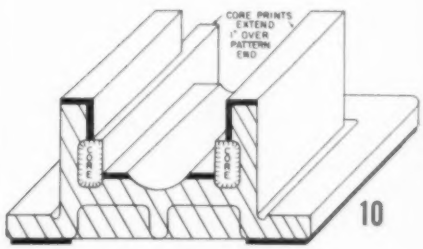
*Type CS, pictured here, is priced $290. complete. It is one of several available types, and represents a real, labor-saving investment. This unit will process a volume of sand equal to the amount 20 men can riddle by hand. Other sizes designed in 10 to 30 manpower capacities.*

most impossible to do so and not break up the mold.

Fig. 5 is an example of a popular method of dry sand coring. The coreprint not only has taper on the sides but also on the ends, making for an easy core set.

The pattern sketched in Fig. 6 reduces the core sand used to less than one-half of that shown in Fig. 5. It found favor with the judges as the coreprints in the end locked it firmly in place.

A disadvantage of the pattern sketched in Fig. 7 is the tendency for the coreprint to scrape the sides of the mold while it is being set, since the coreprint is of the same size as the outside dimensions of the pattern. A crushing strip, such as is included on the pattern in Fig. 2, second from the left in the lower



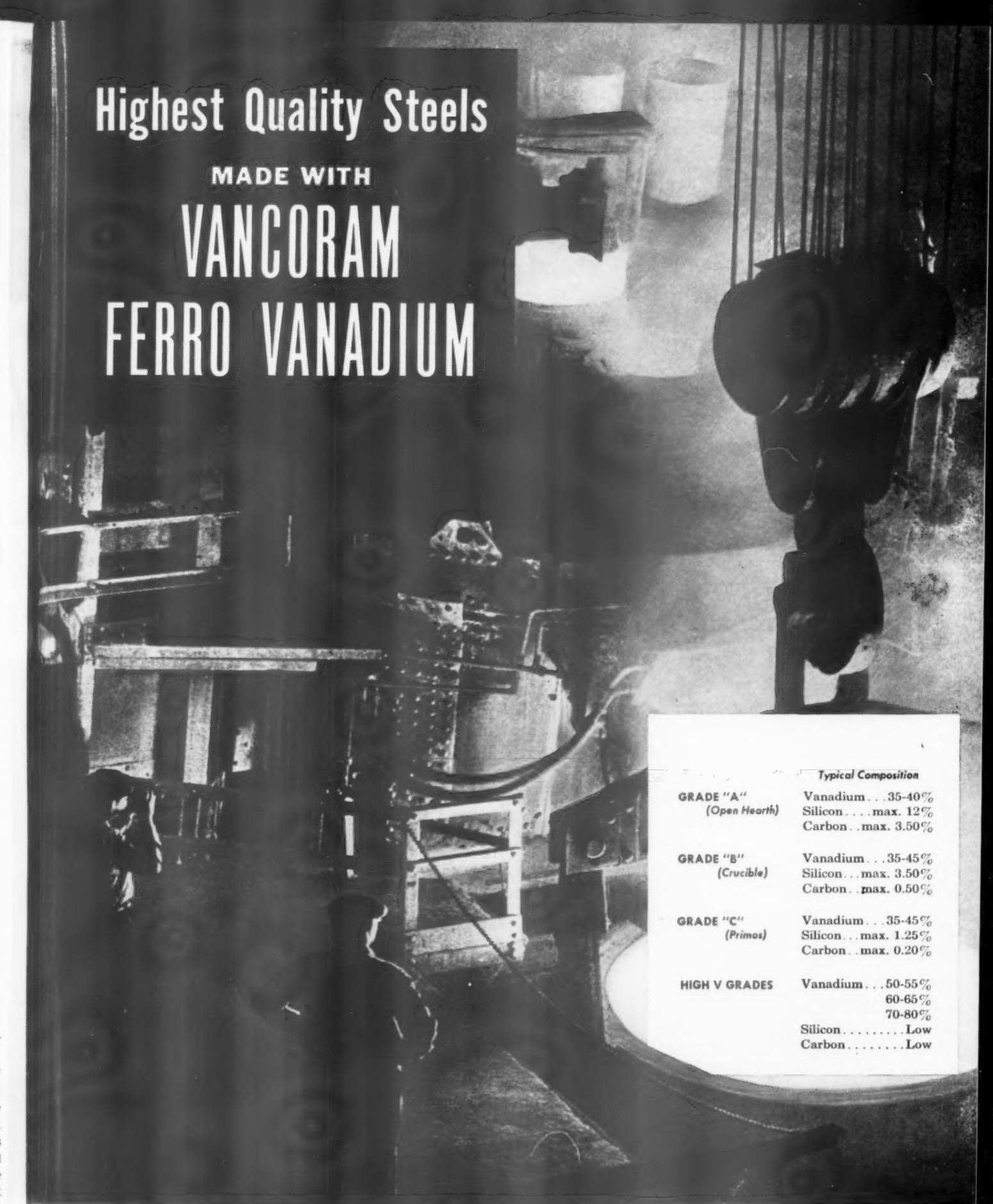

row, would eliminate this danger. The pattern however, is more simple to make than it otherwise would be.

Some of the judges decided that the cores set in Fig. 8 might have insufficient core support and might be tipped unless fastened securely by nailing the core (or otherwise holding it). Some others thought that this was an ideal core set.

In addition to the reference found in discussing Fig. 8 (which also holds good here) there is a possibility that in the case of the pattern sketched in Fig. 9 the flow of metal might tend to raise the core, shutting off the metal at the top and reducing the thickness of the web. It will be interesting to mold this pattern under observation so as to check these theories. The judges were skeptical about this phase of the pattern construction and reduced the score for moldability accordingly.

In spite of the narrow ledge of coreprint found in the pattern sketched in Fig. 10 the judges were in favor of this method of molding. This was because of the coreprints allowed on either end which would lock the core firmly in place. The judges were chagrined to find that the corebox was parted to make the core in halves. The fact that a bed-in box was used did not prevent the double handling of the core.

*(Concluded on page 172)*




| | Typical Composition |
|---|---|
| GRADE "A" (Open Hearth) | Vanadium . . . 35-40%<br>Silicon . . . . max. 12%<br>Carbon . . max. 3.50% |
| GRADE "B" (Crucible) | Vanadium . . . 35-45%<br>Silicon . . . max. 3.50%<br>Carbon . . max. 0.50% |
| GRADE "C" (Primos) | Vanadium . . . 35-45%<br>Silicon . . . max. 1.25%<br>Carbon . . max. 0.20% |
| HIGH V GRADES | Vanadium . . . 50-55%<br>60-65%<br>70-80%<br>Silicon . . . . . Low<br>Carbon . . . . . Low |

# VANADIUM CORPORATION OF AMERICA

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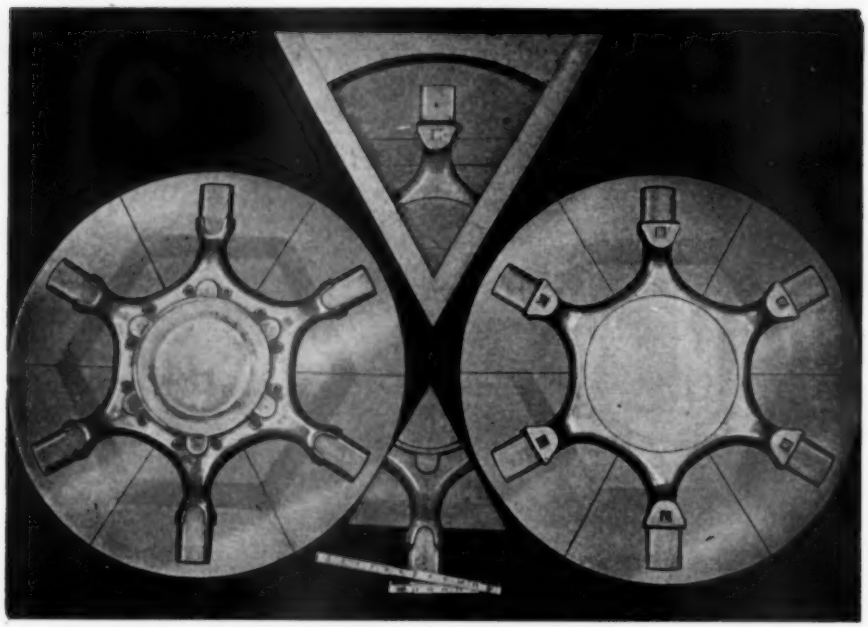
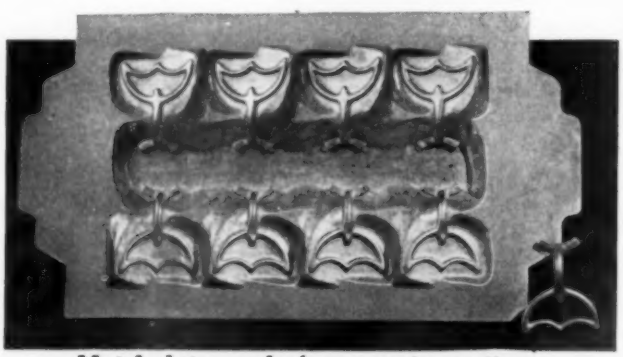


*Cope and drag equipment for truck wheel, made from one spoke (1/6) of wheel.*

## Get More Production and Cut Costs! Use Pressure Cast Matchplates and Cope and Drag Plates

Only one master pattern does it! From it we make you single or multiple pattern matchplates, casting them under pressure in plaster molds. Why not find out exactly how much we can save you by this method, or by furnishing cope and drag plates which likewise jump production and lower your costs? Write us for quotations now.



*Matchplate made from master pattern*

TOLEDO MATCHPLATE COMPANY

534 State Street — Toledo 2, Ohio

*Affiliate—Plaster Process Castings Co., 6922 Carnegie Ave., Cleveland 3, Ohio*

Pressure-Cast MATCHPLATES
COPE and DRAG PLATES

(*Concluded from page* 170)

The time variable ranged from 16 to 41 hours, an average of 25 hours per pattern equipment, or a 10-hour increase over the estimated time of a number of men engaged in bidding on work. However, since the apprentices time in the trade varies from 7 months to 4½ years of a 5 year apprenticeship, the spread is justifiable. It is impossible to segregate the apprentices into homogeneous groups of equality of time in the trade because of numbers; therefore, the beginner must take his chances along with the more seasoned apprentice. His day will come later on in his apprenticeship.

## ST. LOUIS HOST TO AFS CONVENTION

(*Concluded from page* 87)

Registration of ladies will be conducted at Hotel Jefferson, starting Monday. The program will open with a tea at the Chase Hotel on Monday, 3 to 5 p.m. A luncheon will be held Tuesday at 1 p.m. at the Missouri Athletic Club, followed by an informal fashion show. A conducted tour of interesting and historic spots in St. Louis is scheduled for Wednesday, starting from Hotel Jefferson at 1 p.m.

**Luncheons and Dinners** — Round-table luncheons are scheduled by a number of AFS divisions as part of their technical programs. Such luncheons will be held by the Aluminum and Magnesium Division on Monday, by the Brass and Bronze and Malleable Divisions on Tuesday, the Pattern Division on Wednesday, and by the Gray Iron and Steel Divisions on Thursday. The Educational Division will sponsor a luncheon for engineering school graduates on Wednesday, in addition to its dinner meeting Monday evening. Convention visitors from Canada will gather Tuesday evening for their annual Canadian dinner. The annual dinner of chapter officers and directors held in recent years will not be held at this convention.

**Annual Banquet**—W. Stuart Symington, secretary of the Air Force, will be the principal speaker at the AFS annual banquet Thursday evening at Hotel Jefferson. This concluding event of the convention will also be featured by the awarding of gold medals and honorary life memberships in the association to seven foundrymen for outstanding service to the industry. Details of the 1949 awards are presented in this issue starting on page 96.

THE JEFFREY MANUFACTURING COMPANY

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Complete Line of Material Handling, Processing and Mining Equipment

# READERS' COMMENT • • •

## Agrees With Man-to-Man

TO THE EDITORS:

Ralph Lee speaks the absolute gospel truth in his January article. I have always felt the same way. I hope Ralph will keep writing because he has given me many a worthwhile lecture.

LINCOLN PIOTROWSKI
Manager
*North Aluminum Casting Co.*
*1832 N. Ashland Ave.*
*Chicago 22, Ill.*

* * *

## Shrink-Bob Article Useful

TO THE EDITORS:

I have been wanting to write to you for a long time stating how useful the article contributed by Mr. Winte and Mr. Barlow in August, 1945 issue of THE FOUNDRY has been to us in the New Standard Engineering Co. Ltd. for the last two years.

Ours is a "jobbing" type of foundry doing castings both for our own machinery as well as for other engine and machinery builders of Bombay, and for the railways. Before we saw your article we used to have many rejects due to porosity revealed after machining. We have not yet adopted a scientific system of sand preparation and control, nor of metal control, and had kept on guessing each time what could be the remedy. After we assimilated your article we have been able to eliminate this kind of trouble in most of the cases where pains have been taken by our supervising staff to apply the shrink-bob system with understanding and accuracy.

Deserving particular mention was a wedge-shaped casting of locomotive axlebox-guide which tapered from a channel-section about 1⅛ in. thick at one end to a solid cross-section of about 6½ x 3 in. at the other end. By the use of a hot-gated shrink-bob riser of about 3¾ in. diam we were able to machine these wedges practically all over free of cavities.

It takes a fair amount of persistent education and conversion of our workmen to make them appreciate the value of this method of risering, but all the same it becomes worth our while keeping on doing so.

I thought this acknowledgment from this corner of the globe was overdue.

N. M. DAVE
Director
*New Standard Engineering Co. Ltd.*
*Bombay, India*

* * *

## Olivine Sand Silicosis-free

TO THE EDITORS:

In the December, 1948 issue of THE FOUNDRY I have read with interest the "Questions and Answers" department on page 100 where a foundry operator in Great Britain requests information on suppliers of silicosis-free sand. It might interest your readers that Norway has large deposits of the silicosis-free rock, *olivine*, which is ground to form foundry sand. The olivine sand has two advantages as it also has a higher refractory value than quartz. Olivine dust has been tried out on animals as to the possibility of giving silicosis, but so far it has proved that silicosis will not occur.

The sand is now used in all steel foundries and many iron foundries in Norway. We ourselves are using olivine sand in our iron foundry with good results.

AKSEL ARSTAL
Managing Director
*Foss Jernstoperi*
*Oslo, Norway*

* * *

## Jacket Caused Cope Shift

TO THE EDITORS:

The "Questions and Answers" section of the January issue includes an inquiry relating to mismatching of the cope and drag half of a wheel casting.

We have had exactly the same difficulty that your inquirer reports and we finally accounted for most of our trouble in the way the snap flasks were jacketed. We found that the cope was moved on the drag by hasty and careless work in putting the jacket on the tapering mold. The jacket was not held level when being applied to the mold. This had a tendency to make the cope slide on the drag in one direction or the other.

FRANKLIN LAWRENCE
President
*Portland Stove Foundry Co.*
*Portland, Me.*

Nearly 50 representatives of U. S. Naval Shipyards and other naval activities attended the Nonferrous Foundry Conference which was sponsored by the Bureau of Ships, U. S. Navy Department, and held recently at Norfolk Naval Shipyard, Portsmouth, Va.

# THE Redford CORE BLOWER

## CARTRIDGE BENCH TYPE

SEVERAL THOUSAND REDFORDS are now in use in American foundries . . . more and more are being installed. You too will profit by making your small cores with a Redford.

*Write for complete information.*

This foundry uses Redfords because it has a great variety of small work. Core boxes differ considerably in shape and size, yet each operator changes his job many times a day without loss of time. Redford flexibility, speed and simplicity make core blowing profitable, even under the most difficult conditions. The Redford method is original and can not be duplicated by simply reducing the size of conventional core blowers.

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# ACTIVITIES OF FOUNDRY *Groups*

## Wisconsin

REGULAR meeting of Wisconsin Chapter of the AFS held at Hotel Schroeder, Milwaukee, on Mar. 11, featured an address by DeWitt Emery, president, National Small Business Men's Association.

Nominating committee submitted the following slate for 1949-50 officers and directors: President, R. C. Woodward, Bucyrus-Erie Co.; vice president, W. W. Edens, Badger Brass & Aluminum Co.; secretary, George Tisdale, Zenith Foundry Co., and treasurer, Leon Decker, Allis-Chalmers Mfg. Co., all of Milwaukee. Directors Charles Fuerst, Falk Corp., to serve two years; Joseph Gutenkunst, Milwaukee Malleable & Grey Iron Works Inc.; Frank Jacobs, Standard Brass Works; and Kenneth Geist, Allis-Chalmers Mfg. Co., all of Milwaukee to serve three years.

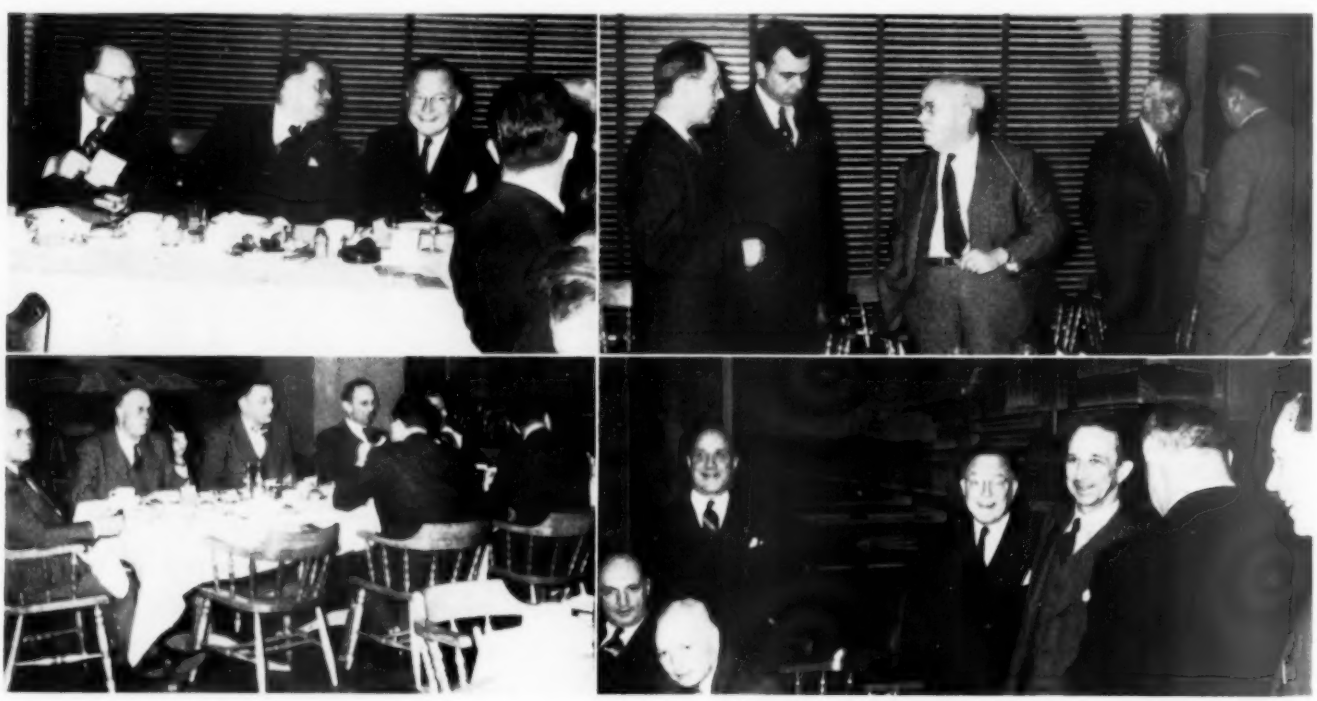
President Woodward, who presided at the meeting, announced the presentation of a modern sand muller to the University of Wisconsin by the chapter for use in its course on foundry instruction. Prof. G. J. Barker, chairman of the department of mining and metallurgy, accepted the check covering the cost of the muller and stated that it would carry a plaque showing the name of the chapter as the donor.

The principal speaker, Mr. Emery, whose topic was "Creeping Paralysis," warned that if this country loses its feedom of enterprise, all other freedoms will go with it. Spending by the federal government to date may be practical, but the place to start economizing is in the 1950 federal budget. He believed that something should be done about the "at least 50 per cent of the federal employees who are sitting around doing nothing."—*John E. Hubel*

## Philadelphia

MORE than 320 members and guests attended the Mar. 11 meeting of Philadelphia Chapter of the AFS held at the Franklin Institute. Dr. G. H. Clamer, president, Ajax Metal Co., Philadelphia, introduced

(*Continued on page* 180)



DETROIT: William B. Wallis, national AFS president, was guest at the Mar. 4 conference of directors and present and past officers of Detroit Chapter of the AFS. At upper left, left to right, are: Past Chairman V. A. Crosby, A. W. Stolzenburg, chairman, and Mr. Wallis. Upper right, left to right: Gosta Vennerholm, Vaughn C. Reid, R. G. McElwee, Ray Wilcox and W. W. Bowring. Lower left, left to right: (Facing camera) Mr. McElwee, Mr. Bowring, A. H. Allen, L. A. Danse and Harry W. Dietert. (Back to camera) Julian Phelps and George Fuller. Lower right, left to right: (Sitting) V. A. Crosby and Ray Wilcox; (standing) Frank Riecks, Mr. Wallis, L. A. Danse, C. B. Schneible (back to camera) and Mr. Vennerholm. Photos by R. Grant Whitehead, Claude B. Schneible Co., Detroit

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are busy in foundries all over the United States performing their vital part in the nation's industry. Where High Production is important, Foundrymen specify . . .

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*If you have a foundry problem . . . call our Service Engineer*
*He knows the answers from practical foundry experience*

Photographs taken at J. E. Gilson Company, Port Washington, Wisconsin

STUDENT GROUP: Members of the Ohio State University chapter of AFS played a prominent part in arrangements for the recent Ohio Regional Foundry Conference. Members of the group, shown here at the conference, are, left to right: H. J. Gonya, chapter chairman, John Anibal, C. J. Weeland, Croft Merritt, David Baker, James Pircung, Frank Stevens, Robert Kuback, Arthur Stoner, Lester Brinser, John Matyskella, Gail McCleary, John Eggleston, David Ekey, William Dundon, Wilford Crese, James Smith

(*Continued from page* 176)

the speaker, Cleveland P. Grant, who presented an interesting lecture on the life of the big-horn sheep of the Rocky Mountains. The film which accompanied the lecture was taken in color and included views of little known parts of western United States.—*A. Saute, American Engineering Co.*

MIT: Views of the regular monthly meeting of MIT Student Chapter of the AFS held Feb. 23 at the school's foundry laboratory

## MIT

FUNCTIONS of the American Foundrymen's Society and Its Relation to Industry and Graduates" was the topic selected by S. C. Massari, technical director of the society, who addressed local foundrymen and members of the Massachusetts Institute of Technology Student Chapter on Feb. 13.

Preceding Mr. Massari's talk, a short business meeting was held at which the following were elected to serve as the chapter's officers for the year beginning in June, 1949: Roland L. Ruetz, president; Thomas J. McLeer, vice president; Robert N. Randall, secretary-treasurer; and Richard A. Poirier, technical secretary.

A brief history of the foundry industry, the functions and aims of the AFS and problems confronting the foundry industry were covered by Mr. Massari. He indicated that the industry as a whole is endeavoring to replace the "skilled thumb" with sound engineering practices. Other problems include the control of dimensions, sales engineering and testing methods as well as overcoming the present lack of co-operation between the designer and the producer.

Since the foundry industry is basic to all others, it is not as hard hit as others during depressions. He also stressed the fact that the AFS provides an opportunity for college graduates, foundrymen and engineers to advertise their qualities by presenting technical papers.

The evening closed with a question and answer period devoted almost entirely to a discussion of the advantages and disadvantages of test bars.

On Mar. 16, Charles W. Briggs, technical director of the Steel Founders Society of America addressed the members of the M.I.T. Student Chapter on the steel casting industry. Mr. Briggs pointed out that steel castings first were cast in molds made of fire brick and clay, later natural sands and finally in the synthetic sands of today. The melting of steel followed a similar course of development. Until 1930, the steel founding industry had very little fundamental and technical knowledge. Such papers as had been presented were merely opinions and speculations.

In 1930 the U. S. Navy became interested in the quality of steel castings and set up a program by which two things could be accomplished: A method to determine the soundness of steel castings, and a research laboratory to find out about the fundamentals of steel castings. Early

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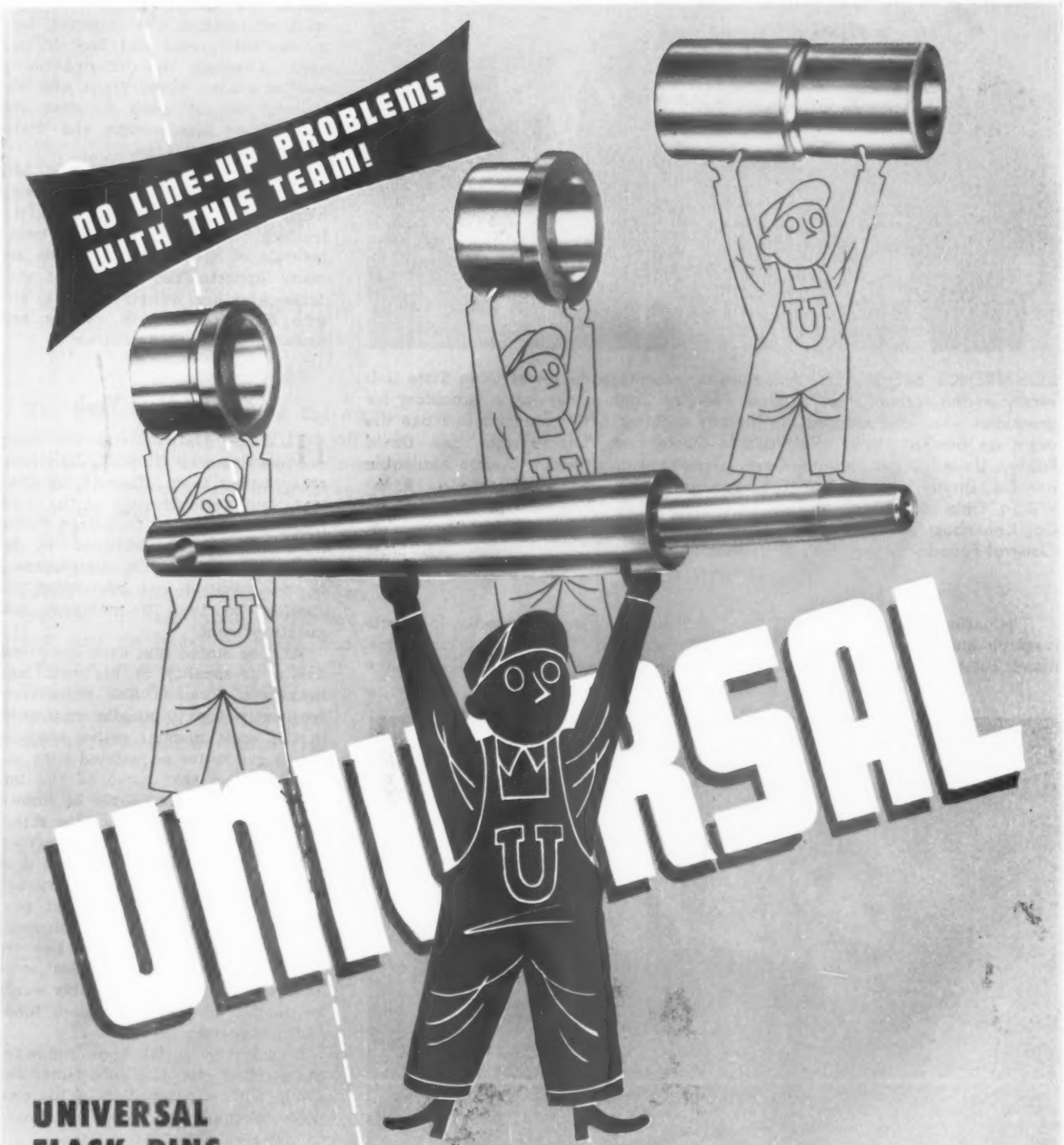


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Here is a team that has helped eliminate cope and drag problems in many foundries — Universal Flask Pins, Bushings and Closing Pins. Cope Bushings are quickly guided to the Drag Pins over tapered, loose-fitting Closing Pins which are quickly removed after assembly. Special design of Elongated Flask Bushing permits longitudinal expansion to compensate for metal heat, without affecting accurate alignment. Round, elongated, press fit and taper types for cast iron, steel, aluminum and magnesium flasks are available for immediate delivery in several sizes. Special types and sizes to order. Write for complete information.

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CONFERENCE BREAKFAST: A feature for recent graduates of Ohio State University at the recent Ohio Regional Foundry Conference was a breakfast for graduates who have entered the foundry industry. It is planned to make the event an annual affair. Participants shown here, left to right, are: David Paisley, United States Radiator Corp., Detroit; Harry Placke, Dayton Malleable Iron Co., Dayton, O.; G. P. McCleary, Superior Foundry Inc., Cleveland; R. W. Wilson, Ohio Malleable Iron Co., Columbus, O.; Richard Patridg, Bonney-Floyd Co., Columbus; Richard Grable, Ohio Malleable Iron Co.; Richard McCormick, General Foundry & Mfg. Co., Flint, Mich., and Prof. R. P. Schneider, Ohio State University

(*Continued from page* 180)
research had been done by the Germans, but the industry in the United States soon showed interest in effects of shrinkage, hot tears, contractions, stress, sands and fluidity of molten metal. Mr. Briggs illustrated how such information was collected, how it was interpreted and how it was used. Although this information is now available, foundrymen and engineers do not seem to read the publications and reports and make use of such knowledge.

The Steel Founders' Society, Mr. Briggs stated, is at present aiding many educational institutions in the training of young men in the fundamentals of steel casting. There are many opportunities for young students who are willing to work and who are interested in quality and research—*Richard A. Poirier*

TWIN CITY Chapter of the AFS is sponsoring a twelve team-bowling league. Views above were taken at the Mar. 25 bowling session

## Central New York

HUMAN relations was the topic discussed by Ralph L. Lee, General Motors Corp., Detroit, at Central New York Chapter of the AFS meeting, Mar. 11, at Onondaga Hotel, Syracuse, N. Y. Chairman C. M. Fletcher, Fairbanks Co., Binghamton, N. Y., presided and introduced the speaker to the 70 members and guests present.

Mr. Lee stated that each individual has a personality of his own, and managers, foremen and supervisors frequently try to handle employees in the same manner rather than to try to get better acquainted with the individual so that some of the unusual circumstances could be known and handled accordingly. This is especially true in large organizations.

The speaker pointed out that it is a challenge for anyone to attempt to co-ordinate many types of personalities into a contented, harmonious group. In closing, Mr. Lee remarked that if more "humanics" were used in industry, there probably would be much less trouble between labor and management.

During the social hour following the meeting, Mr. Lee entertained the group with a description of his own little one-man foundry.—*J. A. Feola, Crouse-Hinds Co.*

## Twin City

MORE than 100 members and guests were present Mar. 3 at the meeting of Twin City Chapter of the AFS held at the Covered Wagon, Minneapolis. Principal speaker was R. A. Quadt, Federated Metals Div., American Smelting & Refining Corp., New York, who discussed "Producing Quality Aluminum Castings."

Mr. Quadt cited the following major causes for difficulties in casting aluminum: State of the ingots or

(*Continued on page* 184)

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Metal Blast's exclusive forming and annealing processes make ANNEALSHOT more uniformly round, harder, tougher and less brittle. You'll find that you do better cleaning and peening, in less time. And you'll find, too, that ANNEALSHOT lasts longer, is easier on equipment. So there's real economy in using it!

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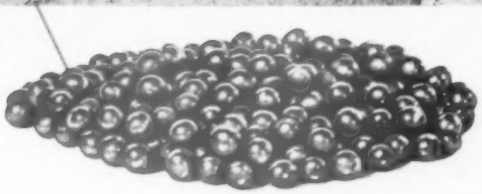

**METAL BLAST, INC.**
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**ANNEALSHOT by Metal Blast**

CENTRAL INDIANA Chapter of the AFS met Mar. 7 at Indianapolis. Shown above at the meeting are: Robert Spurgin, Swayne-Robinson & Co., Richmond, Ind., chapter director; Robert Langsenkamp, Langsenkamp-Wheeler Brass Works, Indianapolis, chapter chairman; Howard Voorhees, manufacturers' agent for Topsall Lubricants Inc. and United Oil Mfg. Co., and V. J. Sedlon, Master Pattern Co., Cleveland, principal speaker at the meeting. Photo by courtesy of staff photographer, International Harvester Co., Indianapolis

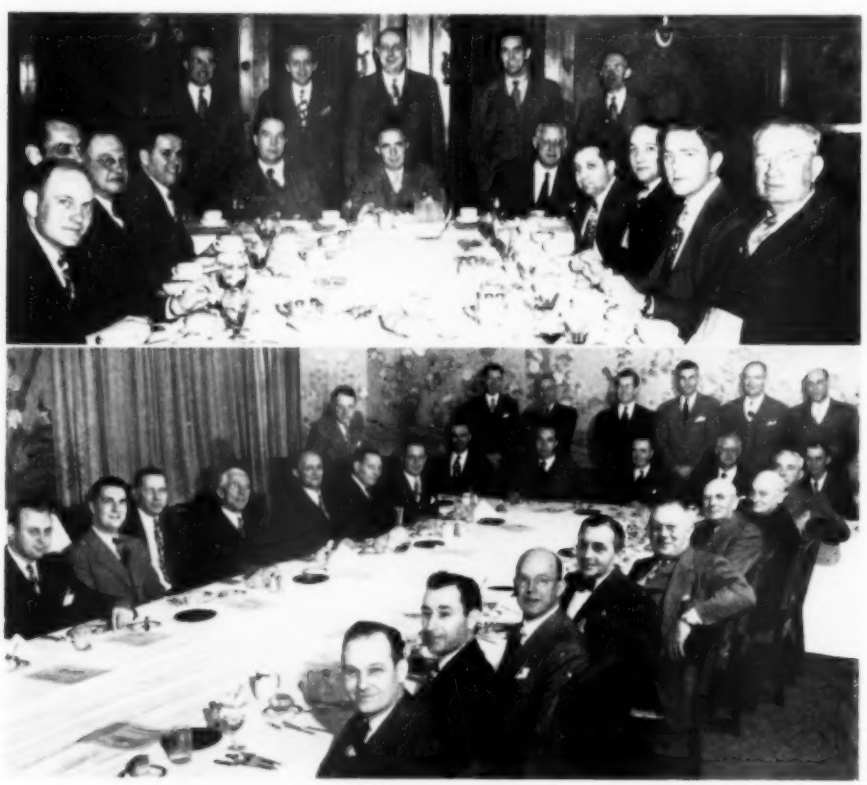
(*Continued from page* 182)

scrap aluminum melted; melting practices and pouring methods, and mold design. Aluminum ingots or scrap exposed to weather tend to corrode sufficiently with an aluminum hydroxide coating to cause minor explosions to occur from the evolution of steam when added to the melting pot. The steam breaks down into atomic hydrogen which causes hydrogen porosity and aluminum oxide. To eliminate this, Mr. Quadt recommended proper storage of ingots and scrap in a dry, dark place and sandblasting to remove the corrosion from ingots.

Atomic hydrogen is the only gas definitely known to dissolve in aluminum in quantity. It is difficult to gas aluminum by bubbling molecular hydrogen through the molten metal. However, by bubbling steam or hydrocarbons through, it is possible to gas the melt.

Degassing of molten aluminum is best accomplished by bubbling chlorine or nitrogen gas through the metal.

To reduce cope blowholes, it is necessary to reduce the turbulence of the metal entering the mold. This can be done by proper pouring and gating.—*J. D. Johnson, Werner G. Smith Co.*



REGIONAL meetings were held by National Foundry Association at Indianapolis Feb. 17, Cincinnati Feb. 24, and Columbus, O., Mar. 3. View of the Indianapolis meeting is shown in top photo, Cincinnati in lower photo. I. R. Wagner, immediate past president of the NFA, presided at all three meetings. L. E. Roark, NFA executive vice president, outlined current Washington activities of the association and an open discussion on business aspects of the foundry industry followed the meetings

## Western New York

AT the regular monthly meeting of the Western New York Chapter of the AFS held Feb. 4 at Hotel Sheraton, Buffalo, William M. Ball Jr., metallurgist and foundry consultant, R. Lavin & Son Inc., Chicago, spoke on "The Effective Essentials in Making a Casting." Robert Bruce, Buflovak Division, Blaw-Knox Co., Buffalo, served as technical chairman.

In planning a casting, Mr. Ball said the first things to consider are materials, machines and men; what metal to use and the pattern of its behavior; melting point; sand penetration; what the casting is to be used for; how many are wanted and how quickly they are needed. Among the essentials in making a casting, Mr. Ball mentioned: Pattern, sand, cores, shakeout, melting, molding of castings, venting, inspection, testing and maintenance. In conclusion he said that plenty of active, honest initiative and tact help make a good casting.

Sixty-five members and guests of Western New York Chapter of the AFS met at Hotel Sheraton, Buffalo, on Mar. 4, to hear Bernard P. Mulcahy, foundry coke consultant of Indianapolis, discuss "Present Day Coke and Its Use in the Foundry." Edmund J. Burke, metallurgist, Hanna Furnace Co., Buffalo, technical chairman of the evening, introduced the speaker. Mr. Mulcahy stated that the best way to operate a cupola depends on the kind and quality of materials charged.

Since the supply of good foundry

(*Continued on page* 186)

# ANNOUNCEMENT

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(*Continued from page* 184)

coke is limited and since the cost of building ovens to produce coke at today's prices cannot be justified, it has been necessary for the past 8 to 10 years to use various kinds of coke, much being of questionable quality and improper size. During the war, better grades of coking coal disappeared and coke producers did their best with the coal at hand.

However, there has been a slight improvement lately, and Mr. Mulcahy pointed out that it pays dividends to remove every other tine in the coke fork to eliminate the smaller sizes of coke when preparing coke for cupola charges. In conclusion Mr. Mulcahy showed slides illustrating what takes place in the ovens during the coking process and the effect of small coke in the cupola. Graphs illustrated the effect of air on carbon and other chemical elements present in the cupola.—*Roger E. Walsh, Hickman, Williams & Co.*

## Detroit Chapter Sponsors Apprentice Contest

DETROIT Chapter of the AFS on Mar. 9, 10 and 11 sponsored for the third successive year a pattern making contest among the apprentice patternmakers in the Detroit area. Sixteen patterns were entered in the contest, and judging took place at City Pattern Foundry & Machine Co., Detroit, on Mar. 12.

Winners were announced and prizes awarded at a dinner held Mar. 12. The five winners received prizes in the amounts of $25, $20, $15, $10, and $5. To each of these, Hugh M. Waterston, Waterstons' Hardware, added a $5 gift certificate for tools.

Prize winners shown in bottom photo, left to right, are: John P. Hall, Ford Motor Co., fifth place; John J. McKay, Apex Pattern & Engineering Co., third; John Siegel, Siegel & Caldwell Pattern Works, second; Lloyd Schroeder, Automotive Pattern Co., fourth, and Robert H. Wunsche, City Pattern Foundry & Machine Co., first. In addition, a certificate of recognition was awarded to City Pattern Foundry & Machine Co. for its efforts in training the first-prize winner.

The judges were: Byrl Deuel, Deuel Pattern Works, Concord, Mich.; Harly S. Ball, City Pattern Foundry & Machine Co., Detroit; E. Gotberg, Automotive Pattern Co., Detroit, and Michael Tschudowski, Packard Motor Car Co., Detroit. Co-chairmen of the contest committee were Willard Kidwell, Packard Motor Car Co., and Jess Toth, Harry W. Dietert Co.

Prizes were donated by the following companies, represented by the men shown in top photograph. Left to right, they are: Harlan Arthur, Apprentice Training Division, Ford Motor Co., Dearborn, Mich.; Ernest J. Ross, Patternmakers Association of Detroit; Dave Martin, Apex Pattern & Engineering Co., Detroit; Jess Toth, Harry W. Dietert Co., Detroit, and William Seese, J. S. McCormick Co., Pittsburgh.

## Chicago

PROBABLY no subject interests foundrymen as a whole as does foundry sand practice. Indication of this was given clearly, Mar. 7, when members and guests of the Chicago Chapter of the AFS, turned out in large number at the Chicago Bar Association to hear this topic discussed by one of the country's sand authorities, C. A. Sanders, vice president, American Colloid Co., Chicago.

Mr. Sanders warned that the time has come when operators must achieve economy in their foundry production and must become increasingly conscious of cost per casting. The best place to start is the sand pile, in his opinion. In this connection, he raised a question as to whether the foundry industry has overmechanized and whether there are instances where synthetic sand has been employed when natural sands should have been utilized.

Commenting on molding practice, Mr. Sanders asserted it is difficult to teach old-time molders the proper procedure under mechanized operation, because they insist upon clinging to long-entrenched ideas. It is better, he said, to train new men who know little about foundry practice.

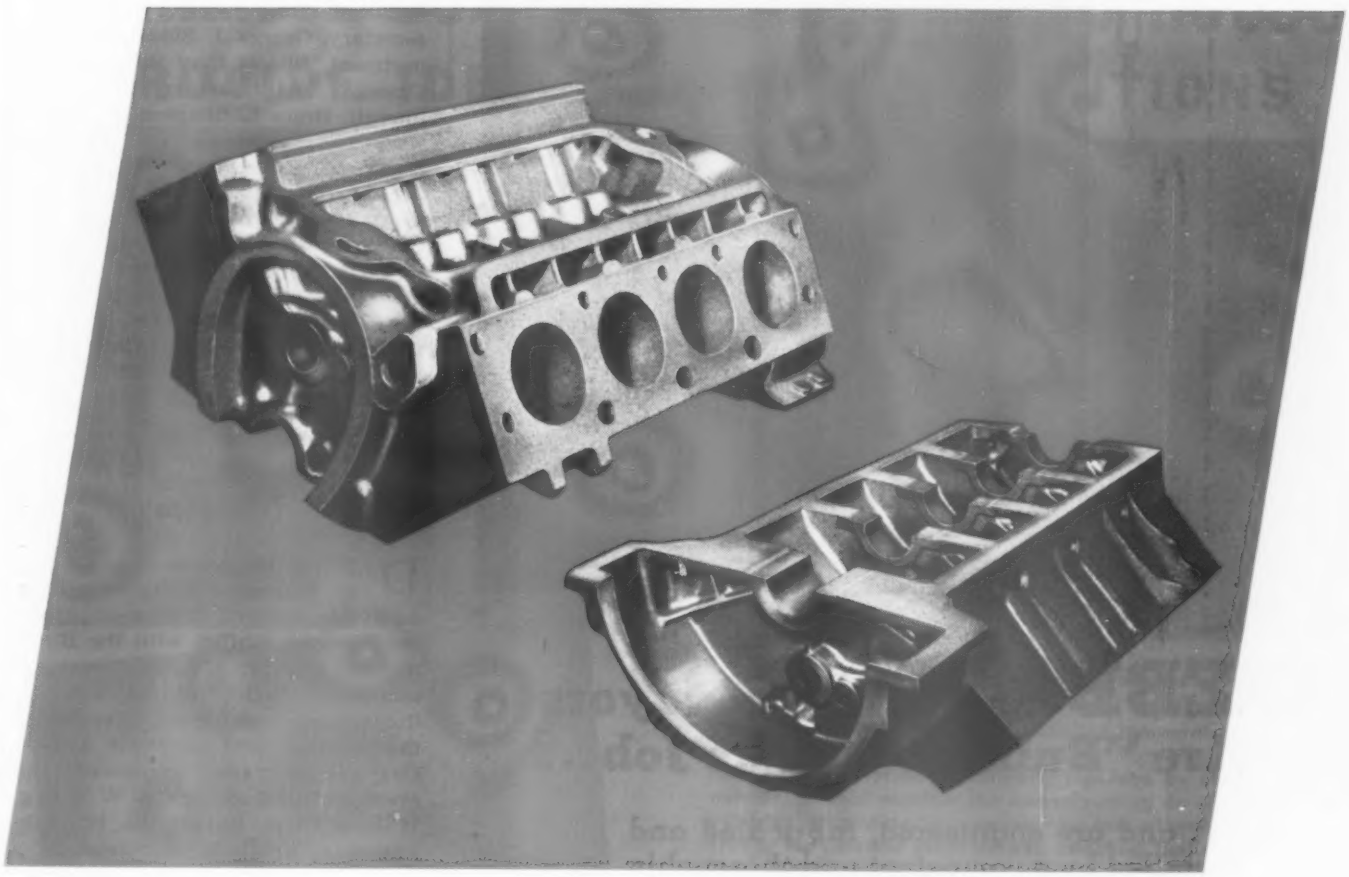
In his presentation, Mr. Sanders covered such matters as sand grain size and distribution, permeability, density, expansion and contraction, heat penetration, and the like. Improvement of sand through additions of wood flour, corn flour and sea coal also were covered. The speaker is a strong advocate of the distribution of sand on five adjacent screens, as opposed to the more widely used three-screen sand. From recent investigations he has conducted, he also maintains that sand can cause metal shrinkage.

With the co-operation of Eugene W. Smith, vice president, Western Materials Co., Chicago, and Victor M. Rowell, technical sales representative, Velsicol Corp., Chicago, Mr. Sanders presented an exhibit of sand standards and a sand penetration demonstration.

During the business portion of the meeting, Past President Fred B. Skeates presented the report of the

(*Continued on page* 188)

# Another Engineering Achievement by BUFFALO PATTERN WORKS



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We invite you to consult us regarding your production pattern requirements.

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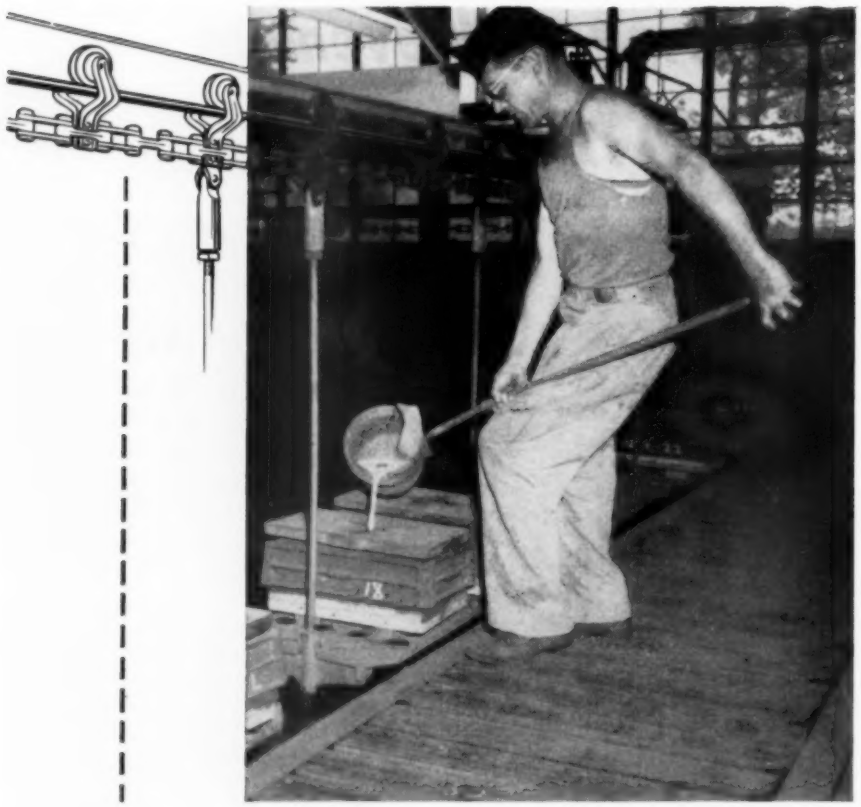

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. . . and are engineered, fabricated and installed by a competent and thoroughly experienced organization.

The illustration shows a typical Webb foundry installation. Molds are carried on an overhead conveyor system to the pouring station; a slat conveyor at proper pouring level travels at the same speed, providing a stable pouring platform. This is just one of the many effective conveyor combinations that can be used to cut foundry operating costs.

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WEBB

*Offices in Principal Cities*

*(Continued from page 186)*

nominating committee for 1949-50 chapter officers. Nominations were as follows:

President, W. D. McMillan, metallurgist, McCormick Works, International Harvester Co., Chicago; vice president, A. W. Gregg, consulting engineer, Whiting Corp., Harvey, Ill.; secretary, George J. Biddle, sales department, Illinois Clay Products Co., Chicago; and treasurer, to succeed himself, Bruce L. Simpson, president, National Engineering Co., Chicago. Nominees for directors include Adrian C. Den Breejen, foundry superintendent, Nichol-Straight Foundry Co., Chicago; Harry J. Jacobson, proprietor, Industrial Pattern Works, Chicago; Walter W. Moore, superintendent, Burnside Steel Foundry Co., Chicago; and Retiring President Chester K. Faunt, works manager, Christensen & Olsen Foundry Co., Chicago.—*Erle F. Ross.*

## Tennessee

DATE of the February meeting of the Tennessee Chapter of the AFS was changed to Feb. 25 in order to avoid conflict with the Birmingham District Chapter's regional conference. Karl Landgrebe, Wheland Co., Chattanooga, Tenn., presided at the meeting held at Hotel Patten, Chattanooga, and introduced the evening's guest speaker, A. W. Gregg, Whiting Corp., Harvey, Ill. His subject was "Youth Encouragement."

Mr. Gregg believes that the industry in general has been negligent in endeavoring to interest young men in the industry and encouraging them to secure proper training. The most important problem, in his opinion, is securing new personnel experienced in foundry practice.

He pointed out that when the United States was very young, immigrants came from European countries with knowledge and know-how of foundry practice. Where will we find the bosses of the future to manage the modern foundry? He suggests the colleges and engineering schools.

In the question and answer period following Mr. Gregg's talk, Mr. Landgrebe introduced Col. Creed Bates, superintendent of public schools for the city of Chattanooga; Frank Huffaker, director of Kirkman vocational school and Marshal Clark, superintendent of county schools. These gentlemen commented that prior to this meeting, they had no idea of what the foundry had to offer young men.

Training classes in general foundry

*(Continued on page 190)*

# *Summer and Winter...*

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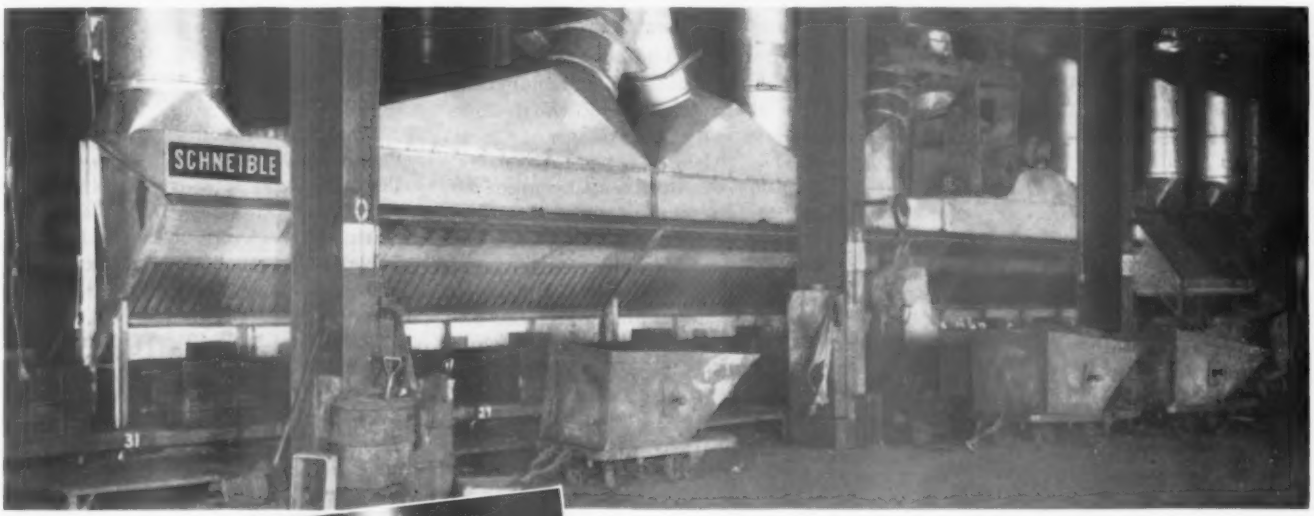
## PROVIDE IDEAL POURING CONDITIONS



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This principle provides cooler building temperatures in summer because the air supply is taken from high inside the foundry. This hot air is naturally replaced by cool air from outside. In cold weather the compensating air is taken from outside the building, thus conserving loss of warm inside air. This lowers power plant output, effecting fuel savings.

The ventilation is improved by directional control of the air-Contaminated area can be blanketed with clean air without directly striking the workmen.

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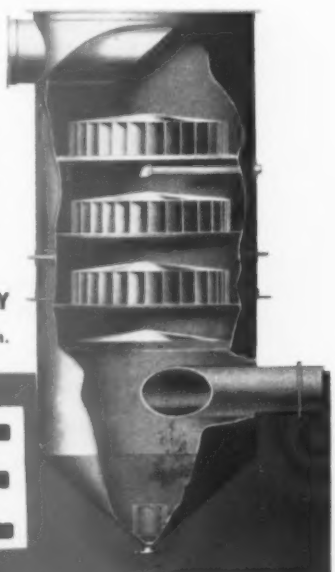

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# SCHNEIBLE

(*Continued from page* 188)

practice for 25 representatives of Chattanooga foundries who later will instruct some 200 supervisory employees in area plants were inaugurated Feb. 28 under the sponsorship of the Tennessee Chapter, University of Tennessee and Kirkman vocational school. The course will extend from 12 to 16 weeks in two-hour sessions one night weekly.—*Carl A. Fischer Jr., Fischer Supply Co.*

## Chesapeake

ACTIVITIES of the Chesapeake Chapter of the AFS during January included a gala oyster party held for the benefit of members and friends at the Club Alcazar. The technical meeting, held several weeks later, divided into three groups for roundtable discussions on nonferrous alloys, cast iron and steel.

Under the able leadership of Robert Colton, metallurgist, American Smelting & Refining Co., the problems associated with production of yellow brass hardware, high-lead castings and high conductivity copper were discussed.

Fred Fay, foundry superintendent, Landis Tool Co., Waynesboro, Pa., guided the gray iron discussions which centered around cupola operations. Some of the subjects touched on were the effect of blast on composition and temperature of the metal, charging coke and anthracite coal and the use of fused soda ash for desulphurization.

The steel roundtable was headed by E. C. Troy, National Engineering Co.

Preceding the roundtable discussions, Comdr. R. H. Lambert, United States Navy, related his experiences with regard to requirements for castings on Navy fighting ships where human lives and the country's welfare depend on good quality castings.

Walter Bonsack, Apex Smelting Co. spoke on "Aluminum and Magnesium Alloys," at the February meeting of Chesapeake Chapter held at the Engineers Club, Baltimore. Increased use of aluminum and magnesium may be attributed to their light weight, corrosion resistance, pleasing color and machinability, as well as their ease of handling in the foundry, improvement by heat treatment and the shortage of steel.

Mr. Bonsack pointed out both the desirable and undesirable foundry and service characteristics of the following alloys: Al-Cu, Al-Si, Al-Cu-Si, Al-Si-Cu, Al-Mg, and Al-Zn-Mg. Light alloy castings may be made by sand, permanent mold or die casting, depending on the number, size and properties. The meeting also featured an interesting coffee talk in which slides were shown concerning the extensive program for improving slum areas in Baltimore.—*Jack H. Schaum, National Bureau of Standards*

## Saginaw Valley

ANNUAL foundry educational series of Saginaw Valley Chapter of the AFS were held during March in the Emerson Junior High School Auditorium, Flint, Mich.

First of the series, held Mar. 3, featured W. B. Wallis, president of the AFS and president of Pittsburgh Lectromelt Furnace Corp., Pittsburgh. His subject was "The Foundry in Everyday Life." George Dreher, executive director, Foundry Educational Foundation, then spoke briefly on the apportunities offered in the foundry. Oscar E. Sundstedt, General Foundry & Mfg. Co., Flint, Mich., and chairman of the chapter, talked briefly on "Foundrymen, Where They Come from and Types of Training Obtainable." The meeting was concluded with a movie illustrating employment interviews and induction.

Second in the series was held Mar. 10, and the subject was "Materials Used in the Foundry." The discussion panel headed by Paul Van Amburg, General Foundry & Mfg. Co., Flint included Frank D. Haskins, General Motors Institute, Flint; Alfred E. Hilgeman, General Foundry & Mfg. Co., Flint; and K. H. Priestley, Vassar Electroloy Products Inc., Vassar, Mich. Following the discussion period, a movie showing modern foundry operations was presented.

The third meeting was held Mar. 17 and was divided into two parts. The first was a movie entitled "Old and New Foundry Practice," with Norman J. Henke, Central Foundry Division, General Motors Corp., Saginaw, Mich., as discussion leader. The second consisted of slides on cupola practice, with Walter Bohm, Buick Motor Division, Flint, as discussion leader.

Final meeting was on Mar. 24. Production of a casting was illustrated by a group of slides which were followed by a roundtable discussion featuring E. L. Waterhouse, Eaton Mfg. Co., Foundry Division, Vassar, who represented management; James Bowen, Chevrolet-Saginaw Grey Iron Division, General Motors Corp., Saginaw, speaking for metallurgists; James H. Bernard, Foundry Division, Eaton Mfg. Co., Vassar, representing costs and purchasing; Morris C. Godwin, Bostick Foundry Co., Lapeer, Mich., production; and Harold Sieggreen, Central Foundry Division, General Motors Corp., Saginaw, pattern and rigging.—*Kenneth H. Priestley, Vassar Electroloy Products Inc.*

## Birmingham

EUROPEAN experiences were related by Lester B. Knight, president, Lester B. Knight & Associates, Chicago, at the regular March meeting of Birmingham District Chapter of the AFS. According to Mr. Knight the nationalization program is now about 95 per cent complete in Czechoslovakia. The few small independent industries left will soon be forced to close down entirely because they cannot continue to operate against so great odds. One must join in the program almost as a matter of self-preservation. To get away from it all, Mr. Knight said, these people would give everything they own and several years of their lives to get into a free country where they could really live again.

These experiences were related at

(*Continued on page* 192)

NORTHWESTERN PENNSYLVANIA Chapter of the AFS celebrated top management night Feb. 28 at its regular meeting. Shown above at the meeting are, left to right: R. C. Reed, C. Morken, B. Miller, L. G. Dunn and Paul Vincent

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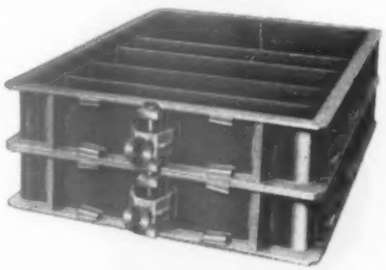

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(*Continued from page* 190)

the dinner meeting when program chairman C. P. Caldwell introduced Mr. Knight and asked him to tell about his recent trip to Europe as official delegate of the American Foundrymen's Society to the first postwar International Foundry Congress held last September.

Dr. James T. MacKenzie, American Cast Iron Pipe Co., and chairman of the chapter, presided. Much interest was also shown in Mr. Knight's talk on "Foundry Mechanization" which featured the evening's technical session. —*J. P. McClendon, Stockham Valves & Fittings.*

## Central Illinois

A TALK on "Corebox Design and Rigging for Core Blowing," by Harry J. Jacobson, Industrial Pattern Works, Chicago, featured the Mar. 7 meeting of Central Illinois Chapter of the AFS held at the Jefferson Hotel, Peoria, Ill.

Mr. Jacobson stated that he believed core blowing is the most important development in the foundry industry in recent years since it enables the industry to keep up with other methods of manufacture and furthers automatic operations in the foundry.

It is next to impossible to lay down all rules of corebox design as all boxes present individual problems. There are many core blowers on the market, but the basic principles of all of them are the same. Some increases in core production with the use of blowers have been phenomenal; however, with improper rigging the box may be ruined or the increases may not be what they should.

Material going into the corebox is more important for blowing than for any other type of coremaking. It should be light and tough so as to be easy to handle and withstand the abrasive action of the sand. Joints must be tight to eliminate air leaks and subsequent sand leaks. Ribbing on the back sides should be so placed to give the greatest support and the tightest fit around the cavity of the box. Proper location of blow holes and sufficient vents are important in lengthening the life of a corebox. Proper maintenance of the boxes as well as the blowers themselves has been proved to be good economy.

Mr. Jacobson was introduced by J. E. Kolb, pattern shop superintendent, Caterpillar Tractor Co.—*V. W. Swango, Caterpillar Tractor Co.*

## Rochester

A REPRESENTATIVE of the Italian Foundrymen's Association spoke briefly at the Mar. 15 meeting of Rochester Chapter of the AFS, held at the Seneca Hotel, Rochester, N. Y.

Max Ganzauge, General Railway Signal Co., Rochester, and president of the chapter, introduced Norman J. Dunbeck, Eastern Clay Products Inc., Jackson, O., and a national director of A.F.S. Mr. Dunbeck reviewed the position of the national office and pointed out the efforts to improve the organization and to serve the membership. Mario Oliva, president of the Italian association, then described conditions in the foundry industry in Italy and told of the hardships and inconveniences that the foundries put up with to produce castings in that country.

Technical speaker of the evening was William B. McFerrin, Electro Metallurgical Co., Detroit, who spoke on "Casting Defects." Covering his topic thoroughly, Mr. McFerrin told of the various elements entering into the problem of defective castings and then illustrated with slides various defects and discussed methods to correct them. He pointed out that pouring and pouring temperatures were very important causes of defects and were probably least considered by most foundrymen. He attributed 24 per cent of defective castings to these causes.—*Herbert G. Stellwagen, Hetzler Foundries Inc.*

## New Jersey

CORE blowing is no longer being used by production shops only, but to an ever-increasing degree by foundries engaged in short-order jobbing work, according to Charles Schwalje, superintendent of foundries, and William Kerner, superintendent, metal pattern shop, Worthington Pump & Machinery Corp., Harrison, N. J., at the regular monthly dinner meeting of the New Jersey Foundrymen's Association at Military Park Hotel, Newark, N. J., Mar. 21. Approximately 100 were present, with H. L. Edinger, Barnett Foundry & Machine Co., Irvington, N. J., president, presiding.

The speakers pointed out that Worthington does a large jobbing business, much of it involving repair orders, and that its core blowing practice has been developed to a point where there is a saving of 59 per cent in price on jobs to which this method can be adapted compared with hand coremaking. They said they have about 150 jobs they can blow, with cores ranging from a few ounces to 100 pounds. The company can blow cores up to 26 in. long, 26 in. high and 14 in. in diameter. The largest castings produced under this method average around 140 to 150 lb, clean and ready for machining.

By the use of the practice which the company has developed, it has been able to eliminate vents by about 90 per cent and the use of wire and rods by 50 per cent. The master cores and driers are made of an aluminum alloy.

Pictures of various cores to which core blowing has been applied successfully by the company were shown with blackboard diagrams

(*Continued on page* 194)

CENTRAL ILLINOIS Chapter of the AFS met at the Jefferson Hotel, Peoria, Ill., Mar. 7, to hear Harry J. Jacobson (shown at right, above) Industrial Pattern Works, Chicago, talk on "Core Box Design and Rigging for Core Blowing." J. E. Kolb, Caterpillar Tractor Co., Peoria is at left in the photo. Photo is by courtesy of Caterpillar Tractor Co.

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(*Continued from page* 192)

used to illustrate various details of the method of procedure.—*Ben K. Price*

## Northeastern Ohio

NORTHEASTERN Ohio Chapter of the AFS held its annual patternmakers' night Feb. 10 at Tudor Arms Hotel, Cleveland. Vincent Sedlon, president, Master Pattern Co., Cleveland, was technical chairman.

The principal speaker was Everard F. Kohl, director of research, Mercast Corp., Cleveland. Mr. Kohl described in a general manner a new process which employs frozen mercury as pattern material in the production of precision investment castings of various type alloys.

Arthur G. Hopcraft, director of purchases, Cleveland Worm & Gear Co. and the Farval Corp., Cleveland, was the coffee speaker. Mr. Hopcraft gave an interesting and entertaining talk entitled "People are Funny."

Patternmakers group of the Associated Industries of Cleveland met at the Tudor Arms Hotel, Mar. 16, to view the film, "Mahogany—Wood of the Ages," produced by the Mahogany Association, Chicago.

George N. Lamb, secretary of that organization, introduced the film and stated that it was designed to tell the story of mahogany and its products historically from the fastness of the tropical jungle to finished products. Filmed in technicolor, it includes the making of mahogany lumber and veneer and reviews the work of the 18th century master cabinetmakers as well as mahogany furniture of contemporary design.

## Metropolitan

CUPOLA operation was the subject of the lecture given by L. L. Clark, assistant foundry metallurgist, Buick Motor Co., Flint, Mich., at the Feb. 7 meeting of the Metropolitan Chapter of the AFS held at the Essex House, Newark, N. J.

Introduced by John A. Van Haver, Worthington Pump & Machinery Corp., Harrison, N. J., Mr. Clark presented a thorough and educational description of the practice followed in the highly mechanized gray iron foundry of the Buick company. This was illustrated by slides showing the installations and various phases of operations. Throughout his discussion, Mr. Clark stressed the fact that control in the foundry industry often is behind times, sometimes to the point that advances in other methods

(*Continued on page* 197)

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(*Continued from page* 194)

of manufacture bring about replacement of castings for parts which traditionally have been made in the foundry.

He suggested that this might be overcome by more rapid advancement in mechanization of foundry processes, encouragement by management in seeking means to overcome the multitude of problems in producing castings and willingness to accept suggestions for changes in both practice and equipment for improving quality and efficiency. Foundry personnel should overcome their traditional backwardness towards new ideas.

He emphasized the stress placed on looking for new methods at Buick, both in production and laboratory control. At present the company is interested in the possibilities of routine instantaneous gas analysis and spectrographic slag analysis for obtaining advance information on conditions of the metal in the cupola in order to exercise closer control over its quality throughout the operation. Mr. Clark's talk was followed by a lively question period.

Aluminum foundry practice was discussed by R. A. Quadt, assistant manager of the general aluminum department, Federated Metals Division, American Smelting & Refining Co. at the Mar. 7 meeting of the Metropolitan Chapter of the AFS held at the Essex House, Newark, N. J. He was introduced by Robert E. Ward, chief metallurgical engineer, Eclipse-Pioneer Foundries Division of Bendix Aviation Corp., Teterboro, N. J.

Mr. Quadt's talk featured an excellent collection of slides, showing typical defects in aluminum castings. These were divided into three sections. Mr. Quadt identified the defects and then discussed methods of eliminating them.

First shown were defects encountered in the melting process: Suspended flux in castings; suspended dross in castings; pinhole porosity due to gassing of metal; piping due to extremely high iron content; effect of pouring temperature on grain size and mechanical properties.

In the next category were defects caused by improper transfer of metal from the furnace to the ladle and the molds. Most important is the effect of turbulence of the metal and the resulting entrapment of air and steam. Methods of overcoming this turbulence through careful transfer and proper gating were shown.

In conclusion, Mr. Quadt dealt with defects due to improper molding and

(*Continued on page* 200)


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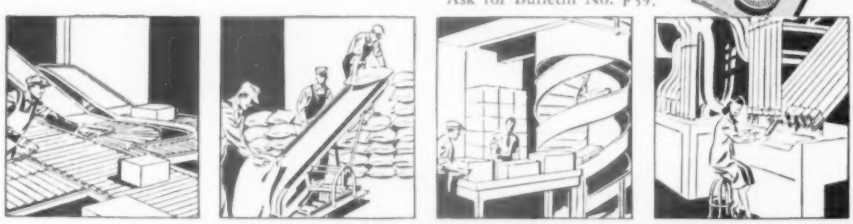

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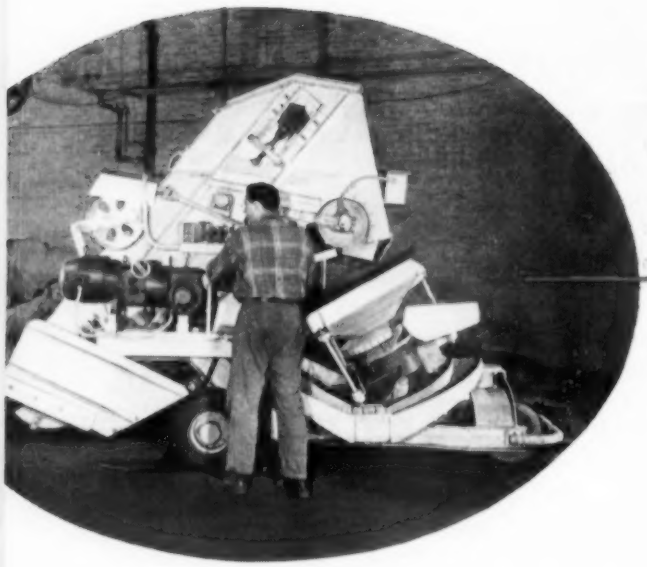

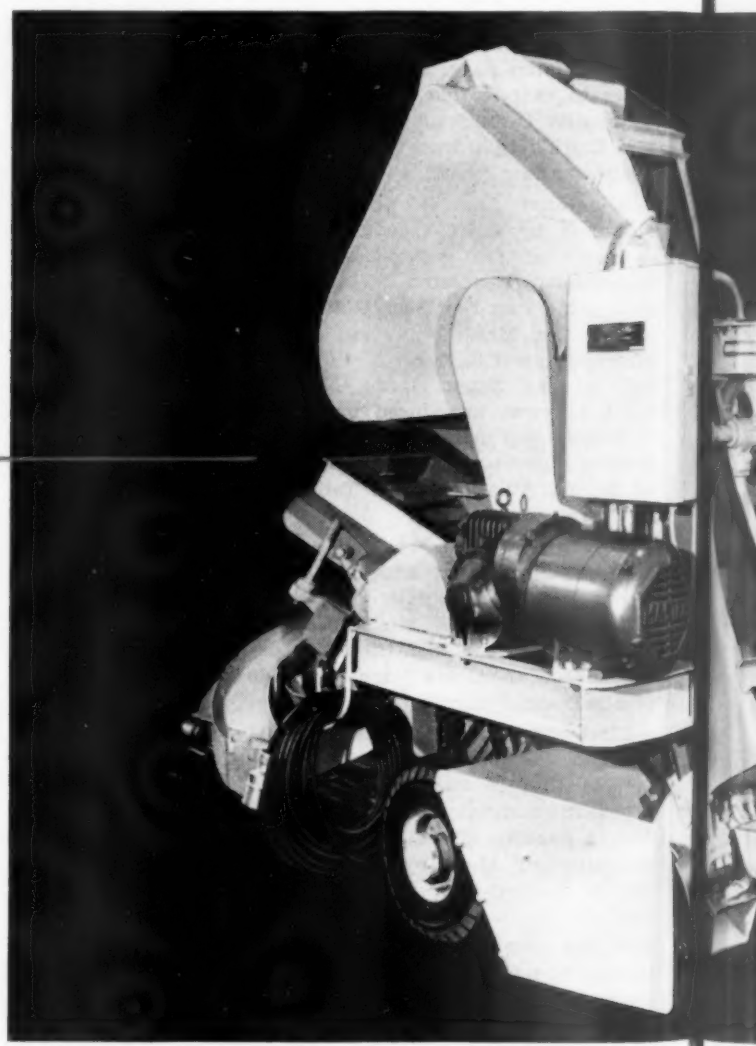

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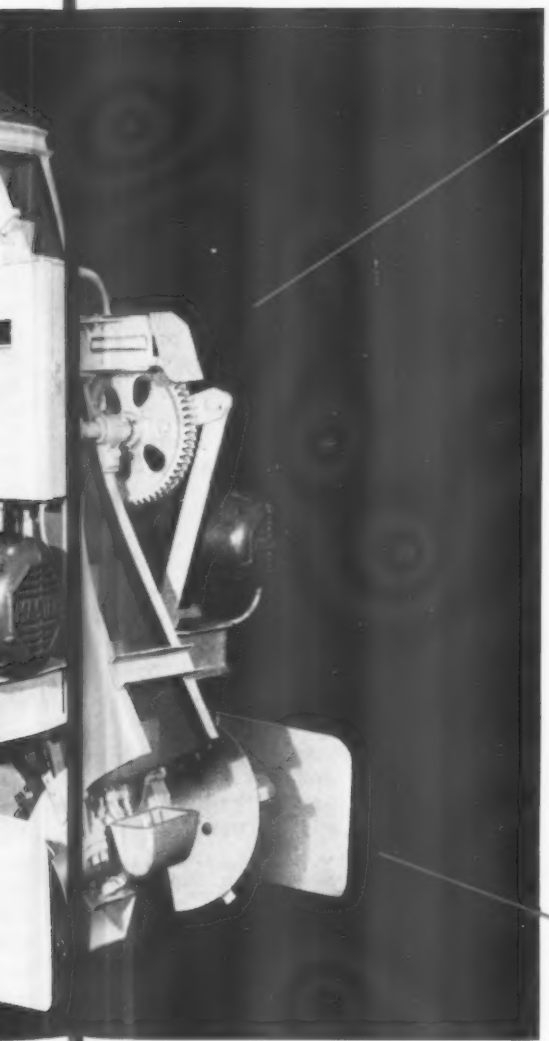

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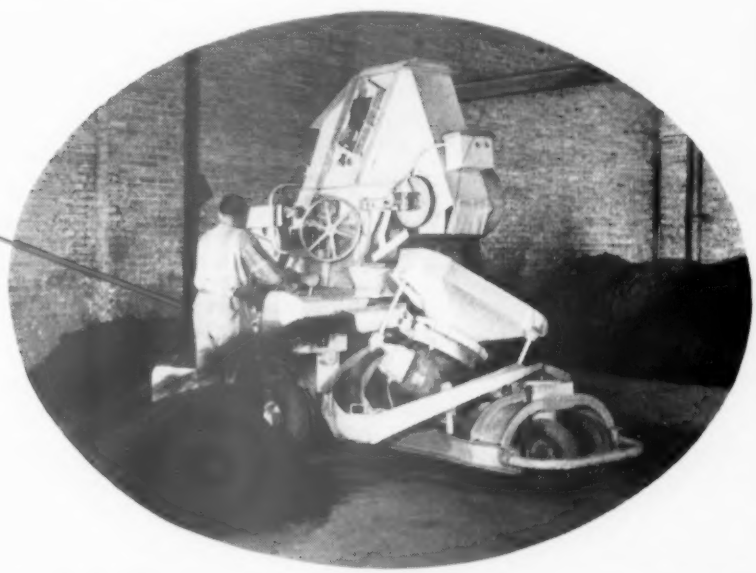

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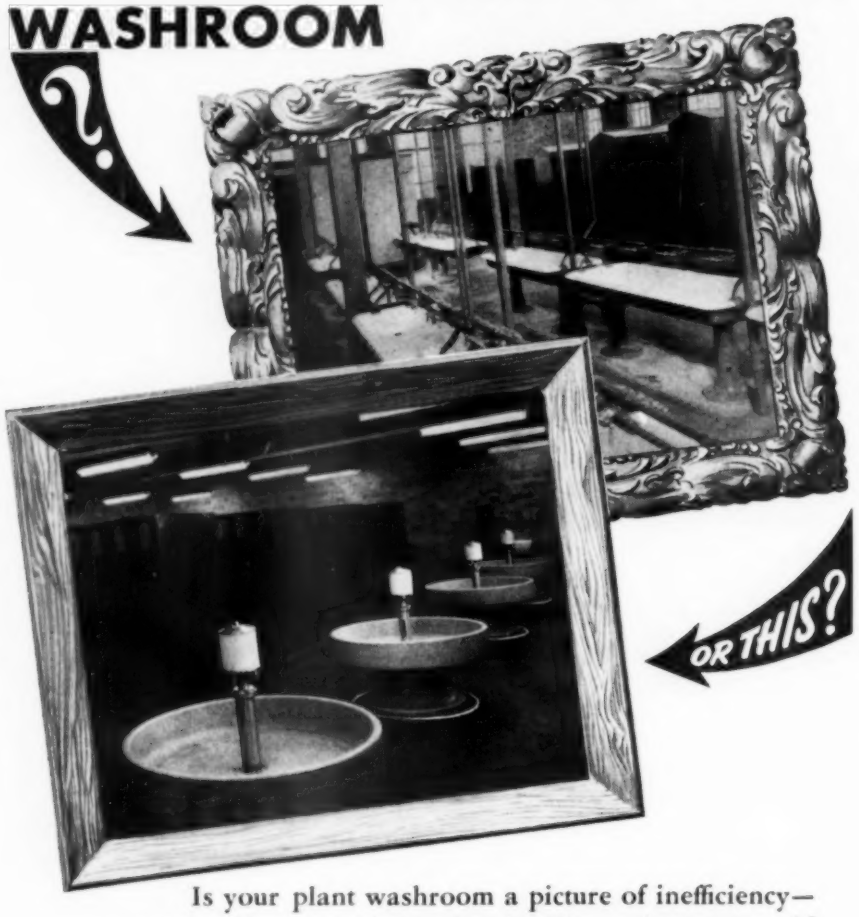


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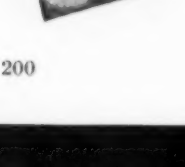


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(*Continued from page* 197)

showed numerous slides illustrating the effect of poor gating and risering on both sand and permanent mold castings. Among these were castings with internal shrinkage due to insufficient risering and surface shrinkage due to improper ingating. A very important phase of molding deals with permeability of sand and venting of molds in order to eliminate air and water vapor as the mold is filled. Mr. Quadt emphasized that due to aluminum's low density, it is most important to use sand of high permeability. — *George Baer, Atlas Foundry Co.*

## Reading

DISCUSSION of the "Application of the Electric Furnace to the Production of Gray Iron" was featured at the Mar. 15 meeting of Reading Foundrymen's Association held at the Berkshire Hotel, Reading, Pa. Principal speaker was W. B. Wallis, president, Pittsburgh Lectromelt Furnace Corp., Pittsburgh, and national AFS president.

Mr. Wallis stated that during the past 30 years acceptance of the electric furnace in the gray iron field has been relatively slow compared with its use in the steel industry. More recently, however, economic conditions coupled with increased demand for high quality specialty cast irons have resulted in a steady increase in the use of the electric furnace. He pointed out that it is especially efficient where controlled analysis and physical specifications are required.— *William I. Cassidy*

## Texas

THE mutual interest of patternmakers and foundrymen to produce good, inexpensive castings is a fundamental fact which cannot be stressed too often, stated Leonard F. Tucker, president and general manager, City Pattern & Foundry Co. Inc., South Bend, Ind., at the Mar. 18 meeting of Texas Chapter of the AFS which was held at the Texas State Hotel, Houston.

Mr. Tucker's discussion on fundamentals of patternmaking and basic essentials of pattern equipment as well as specifications for producing economical castings was both interesting and informative.—*W. H. Lyne, Hughes Tool Co.*

## Pittsburgh

HIGH labor costs and prevailing cost of raw materials are going to make it necessary for the foundryman to put his house in order and to mechanize if he is going to come

out in the black, stated James L. Yates, consulting engineer, National Engineering Co., Chicago, at the Feb. 21 meeting of the Pittsburgh Foundrymen's Association.

In discussing "Plant Engineering As It Affects Foundry Operations," Mr. Yates stressed the fact that mechanization is primarily a form of engineering, and it is for the foundryman to determine the results he wishes to obtain and let the engineer worry it through. Adverse foundry publicity can readily "be lived down" provided other elements of the problem are handled properly, he stated.

Mechanization of any foundry operation is a study in itself and when one endeavors to mechanize one operation, he soon finds out that it affects other departments.

In attempting any program of mechanization, it is important to establish just what is wanted. This may take the form of increased capacity without expenditures for additional brick and mortar, it may take the form of the same production that is currently made but with a lesser labor force and improved price per pound or piece. It may be increased production with the present working force but with enlarged facilities, both equipment-wise and building-wise. It may be the mechanization of a particular department, but it is first and always necessary to set up a target and then find ways and means of placing your "shots" in the proper location in that target.

Mar. 21 meeting of the Pittsburgh Foundrymen's Association was devoted to the subject of "Casting Defects". W. B. McFerrin, assistant manager of development, Electro Metallurgical Division of Union Carbide & Carbon Corp., in addressing the group on this subject stated that the control of casting defects is one of the most important problems facing the foundry industry at the present time.

Steps suggested for correcting any defect permanently were given as follows:

1. Call in all persons in the organization who are familiar with each operation and view the casting.

2. Consider all the facts, fully utilizing all available equipment at your disposal, not forgetting the record file to aid in reaching an honest decision.

3. Consider them with an open unbiased mind.

In many instances casting defects can be attributed to management for failure to carry out its responsibilities, Mr. McFerrin stated, some of which are:

1. Failure to properly determine


...another better method by

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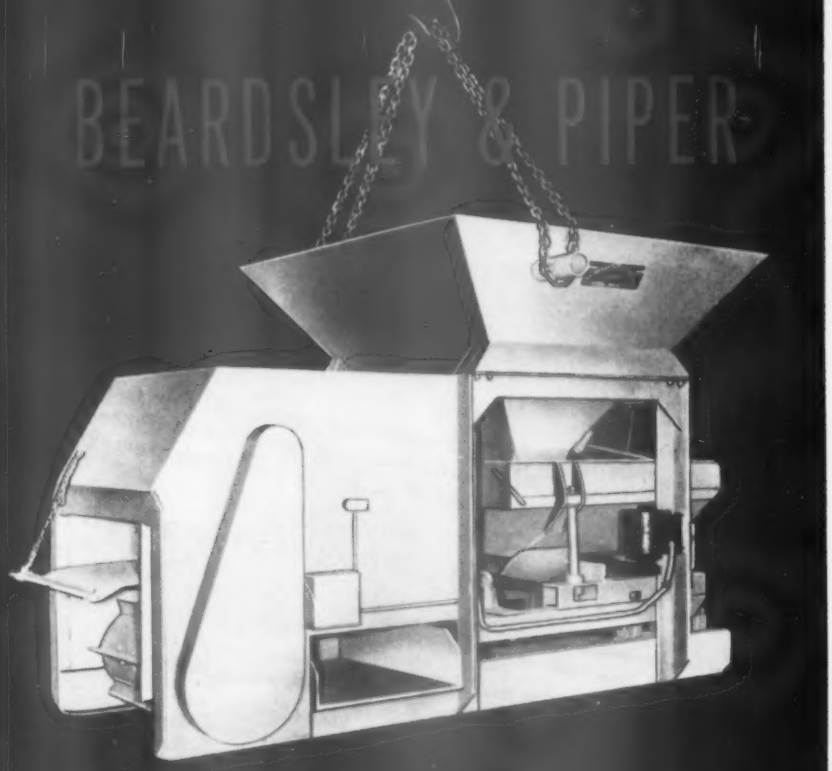

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Rugged construction! High capacity! Proven economy! All combined in the streamlined, portable Preparator. Husky and durable throughout, it is built to withstand the most severe conditions of use. The Preparator, a *complete* sand conditioner, screens, breaks lumps, magnetically separates, tempers, aerates and piles.

The compact Preparator is easily moved to any floor in the foundry by transfer car or by crane. Load centered trunnions provide perfect balance for lifting the Preparator.

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FOUNDRY

ATTENTION

TITLE

ADDRESS

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BAROID
SALES DIVISION
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what type of castings the foundry can produce best, or, in the case of captive foundries, failure to study type of castings to be produced so as to equip foundry properly for producing same.

2. Train operating personnel.

3. Build up and maintain morale of the worker as well as supervision.

4. Too great dependency upon the human element in most operations.

5. Failure to recognize the limitations of human ability, which results in insufficient checks to insure adhering to a uniform and consistent practice.

6. Failure to pick men for the job properly, ending up with square pegs in round holes.

Due to the magnitude of the subject, Mr. McFerrin limited his discussion to those casting defects which are due to shrinkage, blows, scabs and buckles. Causes of each were cited—*Joseph C. Sullivan.*

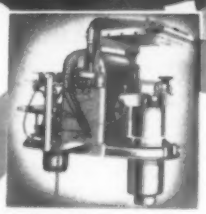
## To Issue Gray Iron Product Handbook

At a joint meeting of the Technical and Handbook Committees, Gray Iron Founders' Society, recently held at Cleveland, plans were developed for issuance of a gray iron products handbook, intended for general distribution among users of gray iron products, engineers, designers, students, etc.

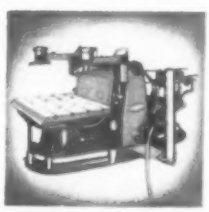
Members attending the meeting included C. R. Culling, Carondelet Foundry Co., St. Louis; E. B. Sherwin, Chicago Hardware Foundry Co., North Chicago, Ill.; J. S. Vanick, International Nickel Co. Inc., New York; James Bowers, American Cast Iron Pipe Co.; Birmingham; Francis McGuire, Sibley Machine & Foundry Co., South Bend, Ind.

## Offers Motion and Time Study Films

University of Iowa has expanded its industrial engineering film loan library which now includes 65 16-mm sound and silent motion and time study films. The films have found wide use in training programs given by industry as well as those offered by colleges and universities. The film loan service is handled on a non-profit basis, rental charge being just enough to cover cost of the service. Copy of Extension Bulletin 631, listing the films, may be obtained by addressing Bureau of Audio-Visual Instruction, Extension Division, State University of Iowa, Iowa City, Iowa.



Jolt Rollover Draw, Model A

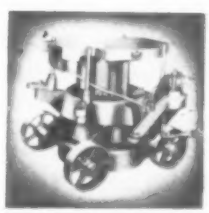


Jolt Rollover Draw, Model SA

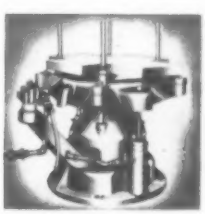
# MECHANIZE or WE SINK

Yes, these are harsh words, but world competition is great. To the foundry which does not install modern, labor-saving equipment, we say: Eventually you'll SINK.

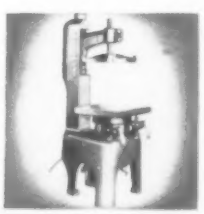
Let us send you our complete catalog. Take a picture look at the "Davenport" line of modern, labor-saving foundry equipment.



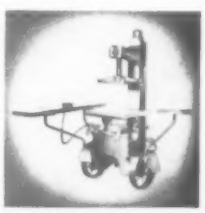
Jolt Pin Lift, Model AJS (portable)



Jolt Pin Lift, Model AJS (stationary)



Jolt Squeeze, Model 10-JX (stationary)



Jolt Squeeze, Model 10-JX (portable)

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# Man-to-Man

## ON THE MOLDER'S BENCH

### "A Pattern Shop Wrinkle"

By RALPH L. LEE

WHETHER or not it's because I'm just backward or lucky, it's getting so that I just can't visit any foundry without picking up some good wrinkle I haven't seen before. Take this last trip I was on. I had a swell visit with the head of the pattern shop of a foundry I went through, which by the way I always make it a point to do—that is, if they have one. I guess I'm sort o' biased when it comes to pattern shops, for I can't get it out of my head that the pattern shop can no more be separated from the foundry than one Siamese twin from another.

This pattern shop boss must have caught on to the way I felt about his business when he learned that I had asked particularly to meet him and visit his place, for he certainly did show me the works from one end to the other. In nothing flat we were up to our necks in shop talk, like two airplane pilots in a hot session of hangar flying. He'd show me one pet stunt he and the boys were proud of and then I'd pop off with something I'd run into in my travels. This would suggest something else he wanted to show me, then I'd come back and away we went.

I know he got a particular bang out of the visit, for he told me that he'd never run into such a steamed-up pattern nut who wasn't in the business. We finally got around to a bit of philosophizing in which he became "Roy" and I became "Doc." "Roy," I said, trying out his first name, "you know, I can't help but think that in spite of all the high-falutin articles that have been written on directional solidification, gating, risering, shrink balls, chills and stuff like that there, we usually end up going at a pattern job on sort of a rule-of-thumb, hunch basis. Maybe that's why it's so darned interesting, sort of a game."

"Well Doc," he said, "I guess you've got something there, but don't you think that there are hunches and hunches, some a darned sight better than others?" I told him that, being only an amateur, his opinion on the subject would probably be more reliable than mine.

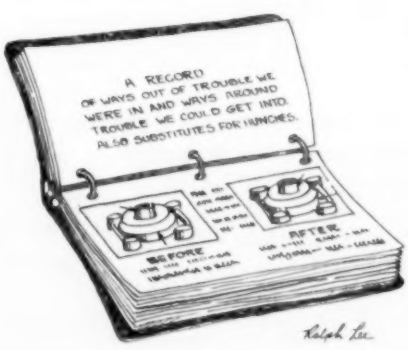
"'But I'll say this," Roy went on, "the farther we can get away from this hunch basis the better off we are going to be. I know for a fact, Doc, that in the past we have guessed ourselves into a lot of trouble and out of a lot of money, through scrap and waste."

"Oh, I don't know, Roy, from what I've seen going through your foundry, I'll bet you're doing pretty good."

"You're darned tootin we are now, Doc, and for a very good reason, I think. We've been doing our best to get farther and farther away from this hunch thing you've been talking about."

Then his face lit up, like a kid about to show off his new bicycle, as he grabbed me by the arm. "Come along, Doc, you're going to see something that is something. A lot of people talk about doing it but few ever get around to it." Then he pulled a loose-leaf book out of his desk drawer and opened it up. "Take a look at that."

On each page of his book there were two snapshots. The one on the left showed a trouble casting, with the gates, runners, risers, shrink bobs and sprue still on it. Then at the right he had another picture of the same casting after the trouble had been licked. In between the two pictures and at the bottom of the page he had typewritten the boiled-down dope of what the pictures couldn't show. The covers of his book were bulging.




I told Roy that I had never seen anything like his book and I thought it was one swell idea. Of course, I realize that just because I had never seen anything like it didn't make it wonderful by a darned sight, but whether it is new or wonderful or not I couldn't help but think that, regardless of how good a fellows' memory might be, he's bound to forget some of the troubles he's had in the past, and as a result make the same mistakes over again.

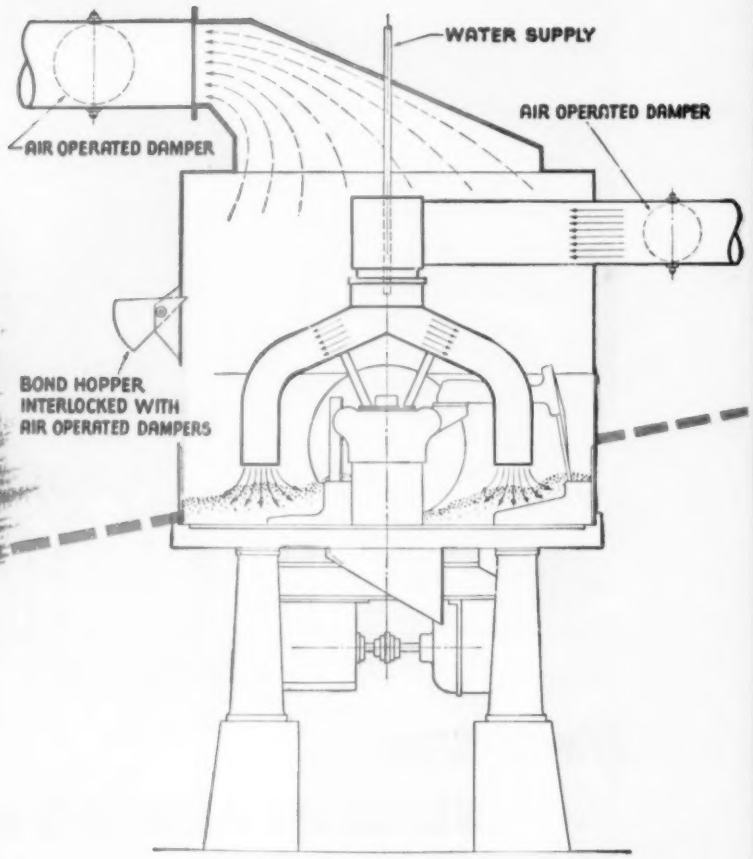
I also realize that there are two kinds of memory—one the conscious kind and the other the unconscious kind that goes to make up a hunch—and I'm sure we'd have one heck of a time doing without hunches of one brand or another. But we all know that the more actual dope we can get down in black and white to back up our memories and our hunches the more nearly we're going to come to doing the job right the first time, whether it be in the pattern shop or the foundry.

Maybe I'm making another mountain out of a mole-hill, but it struck me that Roy's collection of troubles and corrections over the years has grown into about the nearest thing to a real he-patternmaker's manual I've ever seen. I was just thinking that such a book would be a good bet even if we didn't have a pattern shop in connection with our foundry. I sure would like to have a copy for

(*Concluded on page* 206)

# Here's the solution to your HOT SAND problem...

## Install the new NATIONAL *Rotary Cooling Hood* on your SIMPSON MIXER




*—IMPROVES MOLDABILITY*
*—REDUCES SCRAP*
*—CUTS OPERATING COSTS*

THE new National Rotary Cooling Hood now offers a tested and proved solution to the problem of rapidly and efficiently cooling hot foundry sands. Reports from users in many sections of the country offer positive proof that this new high-capacity Cooling Hood provides *complete control* of sand temperatures throughout a wide range of mixing cycles, even under the most extreme sand temperature conditions.

National Rotary Cooling Hoods are now available for installation on standard Simpson Intensive Mixer models. Plan now to install these Cooling Hoods on new or existing Simpson Mixers. Descriptive literature will be sent on request.

## Here's how it works...

The basic principle employed in the new Rotary Cooler is the proved mechanical principle of cooling through evaporation. Excess moisture is added to the sand, and air at high velocity is forced through the sand as it passes over the plows. As the moisture is evaporated, the heat in the sand is transferred to the vapor generated, and carried out of the mixer. A slight vacuum is maintained in the mixer to prevent dust laden air from escaping into the work area.

**LET A NATIONAL ENGINEER SHOW YOU HOW THE NEW ROTARY COOLING HOOD WILL HELP SOLVE YOUR HOT SAND PROBLEMS...**

*Call or write for details!*

# NATIONAL ENGINEERING COMPANY

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Manufacturers and Selling Agents for Continental European Countries—The George Fischer Steel & Iron Works, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia—August's Limited, Halifax, England. For Canada—Dominion Engineering Co., Ltd., Montreal, Canada. For Australia and New Zealand—Gibson, Battle & Co., Pty., Ltd., Sydney, Australia.

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**ELIMINATE DUST**
**earn more profits**
***with PANGBORN Dust Control***

RIGHT—you can eliminate dust problems in your plant and earn a profit at the same time with Pangborn Dust Control. Pangborn removes dust from working areas, protects employees, safeguards raw materials, improves your product, boosts production, recovers valuable materials for re-sale or re-use. Pangborn systems really pay off!

Hundreds of Pangborn units in all types of industries are proof that Pangborn helps you make a profit out of dust problems. A metal specialties plant saves $8000 every year with Pangborn . . . a furniture factory reports over $6000 annual savings with Pangborn on the job . . . savings on materials salvage pays for two Pangborn units for soap maker . . . foundries claim efficient operation is practically impossible without Pangborn dust control.

**FIND OUT ABOUT YOUR PLANT!**

Skilled Pangborn engineers will make a *Dust Pocket Survey* of your plant at no cost to you. The survey may show you how you can save money and get rid of dust all at the same time! Write for complete information on Pangborn Dust Control, Bulletin 909A to, PANGBORN CORPORATION, 300 Pangborn Blvd., Hagerstown, Maryland.

*Look to Pangborn for the Latest Developments in Dust Control and Blast Cleaning Equipment*

**STOP THE DUST HOG**
**from stealing profits with**
**Pangborn**
**DUST CONTROL**

(*Concluded from page* 204)

myself, but since I can't I guess I'll go ahead building one up of my own, snapshots and everything. After it fattens up a bit, maybe I can begin engineering my patterns instead of hunching them and rule-of-thumbing them.

## Course in General Foundry Practice

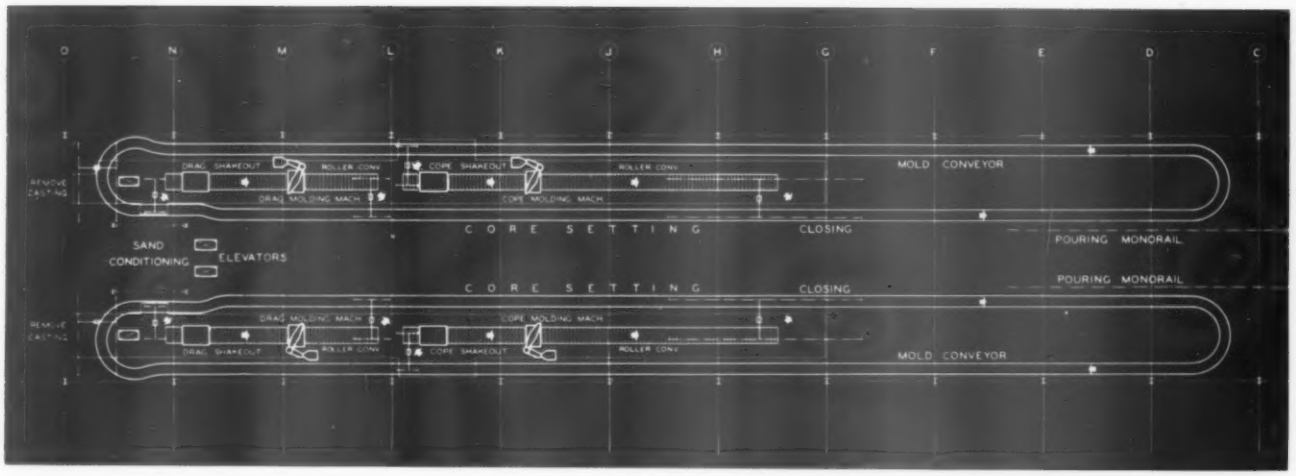
A course in general foundry practice, sponsored by the Tennessee Chapter of the American Foundrymen's Society, University of Tennessee and Kirkman Vocational School, has proved of interest to foundry supervisors being trained as instructors. The course, which began Feb. 28, will continue through June 6. A group of Chattanooga, Tenn., foundries are participating, and instructors are key men from the sponsoring foundry group.

Initial course is being given to 25 supervisors from the local foundries for the purpose of developing a practical outline for them to use as instructors in subsequent courses to be given to foundry supervisors in that area. Training activities are being co-ordinated by G. A. Hesse, assistant production superintendent of the Chattanooga Works, U. S. Pipe & Foundry Co.; Wiley Thomas Jr., University of Tennessee engineering college and Ray Sullinger, director of the University of Tennessee extension branch at Knoxville, and the initial course is being held at U. S. Pipe & Foundry Co., Chattanooga.

Subjects covered so far in the course include: Historical Background of the Foundry Industry; Melting and Metallurgy of Ferrous Metals; Laboratory Control and Physical Testing; and Machine Molding. Schedule for remaining sessions are as follows: Apr. 11 and 18, Hand Molding, W. H. Lawrence, instructor; Apr. 25 and May 2, Sand and Sand Control, Tom C. Alford, Wheland Co., instructor; May 9 and 16, Inspection and Anaylsis of Casting Defects, Carl Barker, Crane Co., instructor; May 23, 31 and June 6, Plant Equipment, Karl Landgrebe Jr.; Wheland Co., and John Lassiter, Combustion Engineering Superheater Co., instructors.

## Proceedings

*Proceedings* of the Engineering College Research Council's 1948 annual meeting held June 14-16 at Austin, Tex., is available from the American Society for Engineering Education, University of Iowa, Iowa City, Iowa, at $1.




## CAMPBELL, WYANT & CANNON FOUNDRY COMPANY, MUSKEGON, MICH.

Improved quality and increased production were the objectives in the engineering and construction of these new cylinder block molding systems.

The many features contributing to high quality production on these molding units were accomplished through the combined efforts of the Owner's production engineers and the foundry engineers of Giffels & Vallet, Inc.

Foundry improvements may be engineered to accomplish desired results and may be planned with a minimum of disturbance to existing production in the foundry.

## GIFFELS & VALLET, INC.

**INDUSTRIAL ENGINEERING DIVISION**
**1000 MARQUETTE BUILDING, DETROIT**

By PAT DWYER

Drawings by RICHEY

# ADVENTURES OF Bill

THE winter has now gone by," I remarked to Bill, "and disappeared into that mysterious region where millions of other winters have gone since this old world first began whirling through space. The time of the singing of birds and all that kind of thing (see "Solomon, His Songs and His Sayings") has arrived. Naturally, all these signs and portents prompt one to ask a somewhat personal and pertinent question."

"I know," Bill interrupted, "you are going to ask me if I have shed the thick, heavy longies and put on the light-weight, sleeveless and legless garments prescribed by what you might call the power behind the throne in every well regulated household. Well, as man to man, I can tell you that the answer in clear ringing tones, is NO! I want something more substantial than the half-hearted piping of an anemic and half frozen robin to convince me that the winter is over."

"As a mind reader, guesser and amateur bluffer you have about as much chance of hitting the jackpot as the averge citizen or citizeness has of hitting the jackpot on a radio program. Which is just another way of saying that I am not interested to the slightest extent in what kind of material you wear next to your hairy hide. In fact, I might go a step farther and say that as far as I am concerned you could prowl around without any shirt."

"Now he wants me to get a dose of pneumonia—"

"Wrong again as I might have expected. You have had two shots at the target and I don't mind telling you, in strict confidence, I shall have to give you a rating of NG, no good. You did not even touch the outer rim—"

"So now we are mixed up in an archery contest. That gives you a chance to spring some of the stuff you pinched out of the story about Robin Hood and his merry band of light and heavy law breakers under the greenwood tree. These lads could whang a whistling cloth yard shaft through one of the king's deer about as far away as he could see him or her. Haunches of venison, male or female, all look alike after they are cooked. Apparently the hunters rarely shot each other, although dressed in Lincoln green instead of the bright red jacket and cap, supposed to be worn by lads with the lust for killing in the land of the brave and the home of the more or less free.

"You do not need to worry. So long as you keep up that everlasting chatter, no hunter is going to mistake you for a deer, or any other kind of a wild animal on four legs. Listen for a minute and I shall repeat my original observation, namely, to wit, as follows: Condition of the weather prompts one to ask a somewhat personal question. You immediately gallop off with the bit between your teeth and get lost in a dense forest of waving undershirts, doses of pneumonia, Robin Hood and his band of polite and gentlemanly robbers."

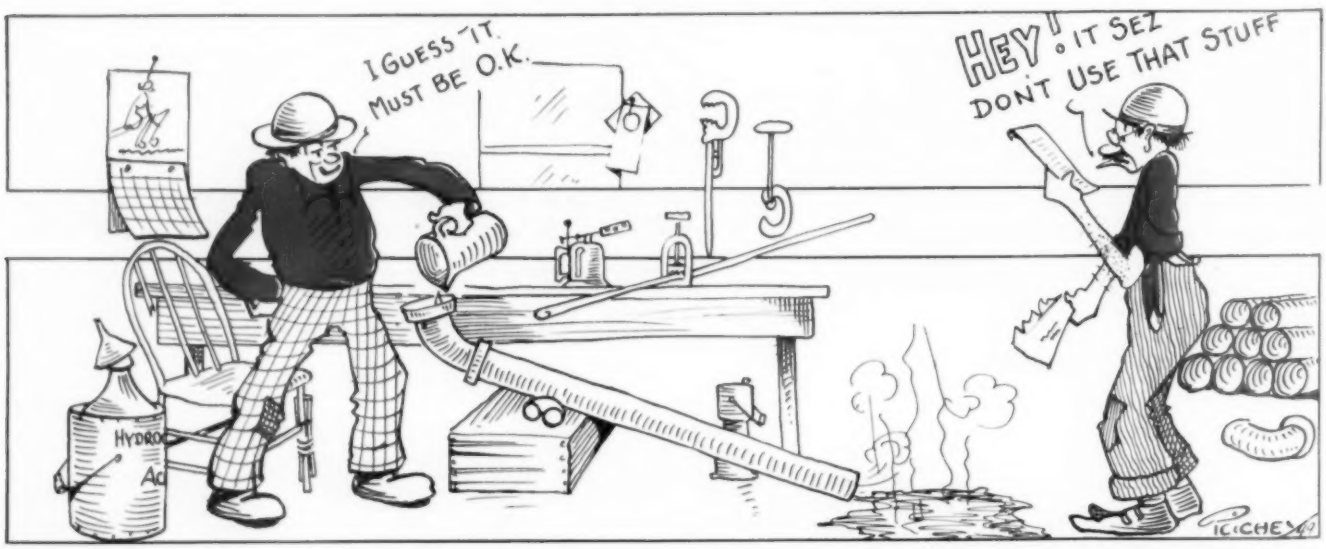
"I had none of these things in mind. The harbingers of spring or summer, little tweet-tweet birds and all that sort of thing, prompted me to inquire if you had completed your plans and arranged a program for the annual vacation."

"Well, yes and no."

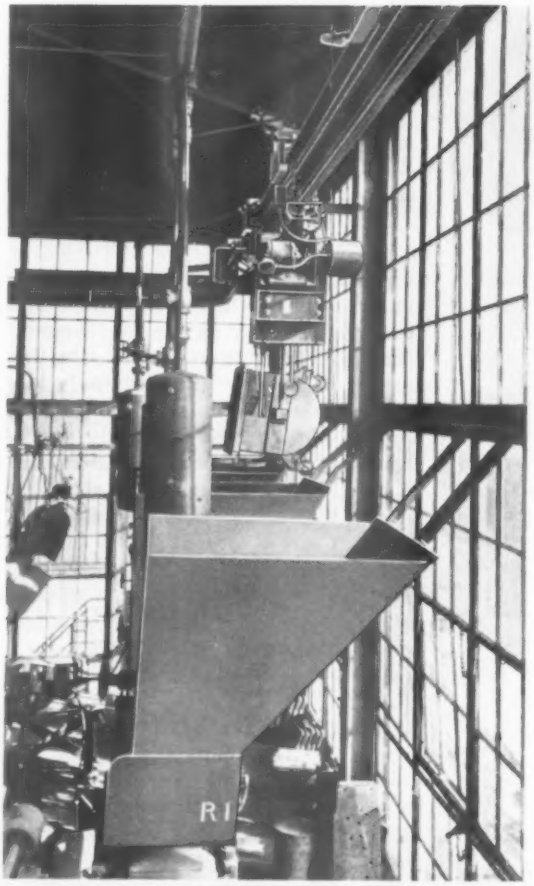
"What do you mean, yes and no? Dash it all, man, either you have or have not attended to all the preliminaries. Picked out a place, notified certain people, applied for train, boat or airship transportation. Presumably your destination does not include travel by dog team, covered wagon or canoe, and I am reasonably sure you are not going to walk. Finally, and here we touch on a delicate point, have you, or will you have the necessary funds to reach from one end of the program to the other end. Very embarrassing to write your uncle Joe for a small donation and in reply receive a wire from this tightwad relative: SOME SAYS YES, SOME SAYS NO. NUTS TO YOU FROM UNCLE JOE."

"That's where you fall into a some-

(*Continued on page 210*)




Deleterious effect of hydrochloric acid on metal pipe, as explained in words of one syllable



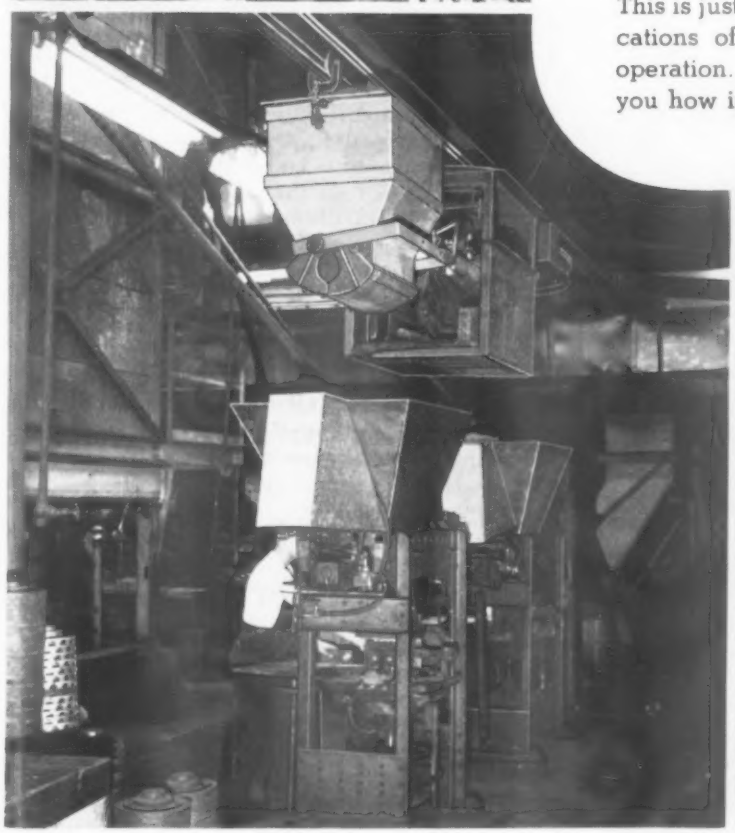
# AMERICAN MONORAIL *Systems*

## Deliver Core Sand Fresh When Needed

Many foundries are eliminating much of their floor congestion with American MonoRail handling systems, in addition to delivering small batches of fresh sand when needed.

One foundry automatically feeds 7 stations on each of 4 single tracks from muller. Station may be increased to sixteen on each track when required. Other foundries supply multiple station in single line by cab control or automatic control. These systems deliver, dump and return to muller by push button control or cab operated.

This is just one of many money and time-saving applications of American MonoRail systems in foundry operation. Let an American MonoRail engineer show you how in your foundry.

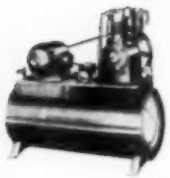


**THE AMERICAN MONORAIL COMPANY**

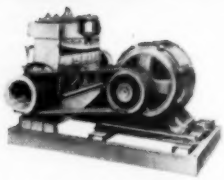
**13104 ATHENS AVENUE** **CLEVELAND 7, OHIO**

## CHOOSE THE COMBINATION SUITABLE FOR THE JOB!

*There's a Schramm Size for every Requirement*

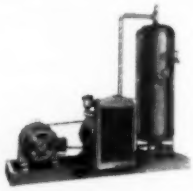


**SMALL INDUSTRIAL COMPRESSORS...** from ¾ to 5 H.P. single or two stage with horizontal or vertical tanks, working pressures, single stage up to 150 pounds and two stage up to 200 pounds pressure.



**"V" BELT DRIVE ON BASE WITH MOTOR** ... this type assembly has proved very popular because it permits the use of the most advantageous operating speeds where only odd frequencies and voltages are available.

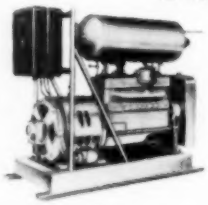
**MODEL 50 "BUILT-IN" MOTOR DRIVE...** the overhead tank unit is only one of the many models and combinations of this small compact industrial compressor that can be bolted direct to any substantial floor.



**COMPLETE WITH VERTICAL TANK AND COOLING UNIT...** a package that simplifies installation. Compressor is mounted complete with motor, vertical tank and cooling unit on base that can be bolted to any solid foundation.

**HEAVY DUTY "V" BELT DRIVE...** built in sizes ranging from 157 to 609 cubic feet displacement, suitable for service twenty-four hours per day with the lowest up-keep and operating costs.

**DIRECT MOTOR DRIVE WITH COOLING UNIT...** the built-in type utilizes to the fullest extent the efficiency of motor and compressor. No external flywheels or pulleys, no vibration and no bolts to adjust.



**OVERHEAD TANK, STARTER AND COOLING UNIT...** the advantages of this type of installation are, the absence of any external parts, no belts to be maintained, or to be replaced when worn out, small floor space required. This unit is practically vibrationless in operation, and can be placed and operated on any floor of sufficient strength to carry the load, no foundation is required.

*WRITE FOR BULLETIN 4810*

# SCHRAMM INC.

**THE COMPRESSOR PEOPLE • WEST CHESTER • PA.**


(*Continued from page* 208)

what popular error. Either that or you failed to supply yourself with uncles in your youth. If you had attended properly to this little family detail you would know that uncles were especially designed to take up the slack any time the small boy's slender financial rope broke, or showed that it was on the edge of breaking. The uncle is on hand bearing gifts on birthdays, high days and holidays and on any other occasion that gives him an excuse to raise the active or reserve fund of the adoring nephew. Singularly enough, the boy seldom or never properly appreciates a generous uncle until he has a nephew or nephews—and of course—nieces of his own. Fortunately, I won't need to touch the old boy for a donation of any kind this time. By carefully hoarding the pennies and by restricting myself to a frugal diet of bread and milk, I estimate I shall have enough of the folding stuff to get by."

"You may get by, but I am inclined to the opinion that for the remainder of your life, the sight of a bowl full of bread and milk will give you a reaction approximately equal to that experienced when the lid is lifted from the garbage can."

"Talking about eating and garbage cans and other light and frothy items of conversation, I wonder if you have heard a little story going the rounds recently. It is supposed to be funny, but like many funny stories it is based on the resentment felt by one group of men, when members of a second group, temporarily in positions of authority, put on the high hat.

"A New York city plumber wrote to a bureau in Washington. He claimed that hydrochloric acid was a highly satisfactory material for cleaning or flushing clogged or choked drain pipes. The bureau wrote him very courteously: 'The efficacy of hydrochloric acid is indisputable in this particular application. However, the corrosive residue is incompatible with metallic permanence.'

"The plumber acknowledged receipt of the message. He was highly gratified to find himself in thorough agreement with the august governmental body.

"The bureau wrote him again: 'We cannot assume responsibility for the production of toxic and noxious gas with hydrochloric acid. We earnestly suggest you cease and desist in this practice and adopt and employ a suitable alternative procedure.'

(*Continued on page* 212)

AT THE OLIVER CORPORATION

*South Bend, Indiana*

SUPERINTENDENT OF MAINTENANCE
*Mr. James Reddrick*

"Even with three Dustube Dust Collectors in our cleaning room, we have not spent a dime on repairs for years. Maintenance is easy and inexpensive with few working parts to wear. Inspection of the tubes takes only a few minutes of our regular oiling crew—one glance tells tube condition. The Dustube is certainly the least expensive of all dry type collectors to operate and maintain. And I can go one step further and say that the Dustubes are the most trouble-free pieces of equipment in our whole plant."

## ALL AGREE ON ONE POINT:

# *It pays to own a DUSTUBE!*

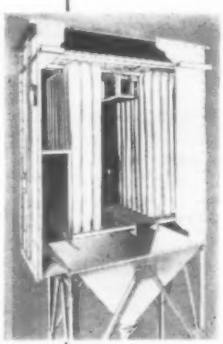
One person likes Dustube's low-cost operation . . . another its high efficiency. However, all agree: "It pays to own a Dustube," because the use of a Dustube effects savings in so many ways. Its simple, practical design provides the highest efficiency at the lowest cost that you will find in any type of dust collection equipment. It will pay for itself quickly in direct cash savings . . . and pay you a profit for many years to come.

CLEANING ROOM FOREMAN
*Mr. John Sokola*

"The cleanliness of our gray iron and malleable cleaning room is evidence of the high efficiency of the Dustube Dust Collector. They have to be good to handle the heavy volume of dust created in our foundry—one Dustube ventilates 30 grinders, 10 tumbling mills, a large Wheelabrator Cabinet and a Tumblast. The other Dustube collects the dust from 12 grinders and from two large Wheelabrator Tumblasts. Because of the efficient method of shaking a Dustube, shaking periods are short—there is no delaying of our cleaning room schedule for this operation."

GRAY IRON AND MALLEABLE FOUNDRY SUPT.
*Mr. William Johnson*

"In terms of efficiency and cost-saving performance, our Dustubes are the best investment we have ever made. Operating costs are confined to supplying power for the fans and shakers. Power costs are exceptionally low due to the ample spacing of the tubes which decreases resistance to air flow. There are practically no maintenance costs. We have experienced no cloth wear from the abrasive action from the dust-laden air."



**DUSTUBE ADVANTAGES**

BETTER DUST REMOVAL—Simple, fast, thorough. Shortens cleaning time.

POWER SAVINGS—Lower resistance to air flow. Lower air velocities.

HIGH EFFICIENCY—Nearly 100% efficient by convincing tests.

EASE OF INSPECTION—Clean, safe, simple. No parts to remove.

DUSTUBE FILTERS—No abrading metal contact. Easy to ship, store and handle.

FILTER REPLACEMENT—Takes only a few seconds. Requires no tools.

*Write today for complete information about the many advantages of Dustube collectors. Ask for Catalog 72-A.*

American dustube
DUST COLLECTORS

OFFICES IN PRINCIPAL CITIES

**AMERICAN WHEELABRATOR & EQUIPMENT CORP.** 505 S. Byrkit St. Mishawaka 2, Ind.

THE FOUNDATION of efficient and economical foundry operation is a well-planned "Floor." This allows for supervision, maintenance, order and cleanliness.

A high rate of operations requires both planning and supervision to avoid discouraging delays.

Crucible Melters' Handbook may help you; a handy little volume that is intensely practical. Sent free, of course. Just write for it.

*A battery of gas-fired stationary crucible furnaces at U. S. Naval Gun Factory, Washington, D. C. The pipes manifolded to each set of three furnaces supplies the air at one pound pressure for mixing with natural gas. This unretouched and unposed photograph strikingly illustrates the good housekeeping practices observed in this foundry.

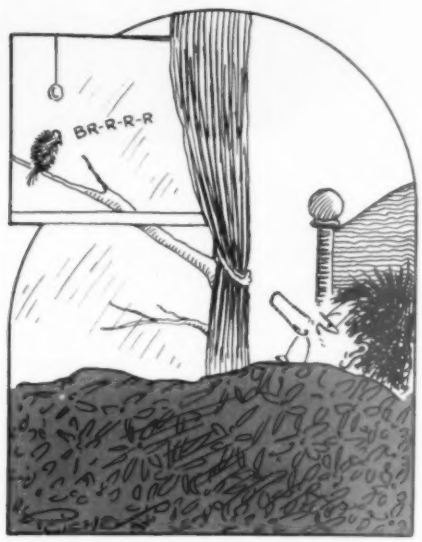
CRUCIBLE MANUFACTURERS ASSOCIATION
90 WEST STREET
NEW YORK 6, N.Y.


(*Continued from page* 210)

"The plumber again rose to the occasion. He assured the bureau he would be glad to quote them, and thus prove to any doubting Thomas that he was keeping up with the times and had heavy governmental backing.

"Apparently the correspondence fell under the eye of the Chief, or the eye of some person who knew something about the subject. He sent the plumber an air mail letter: 'Don't use hydrochloric acid, you dope. It eats hell out of the pipes.'

"In the foundry," Bill continued, "and probably elsewhere, one thing follows another. I had a letter recently from a foundryman who was contemplating the manufacture of



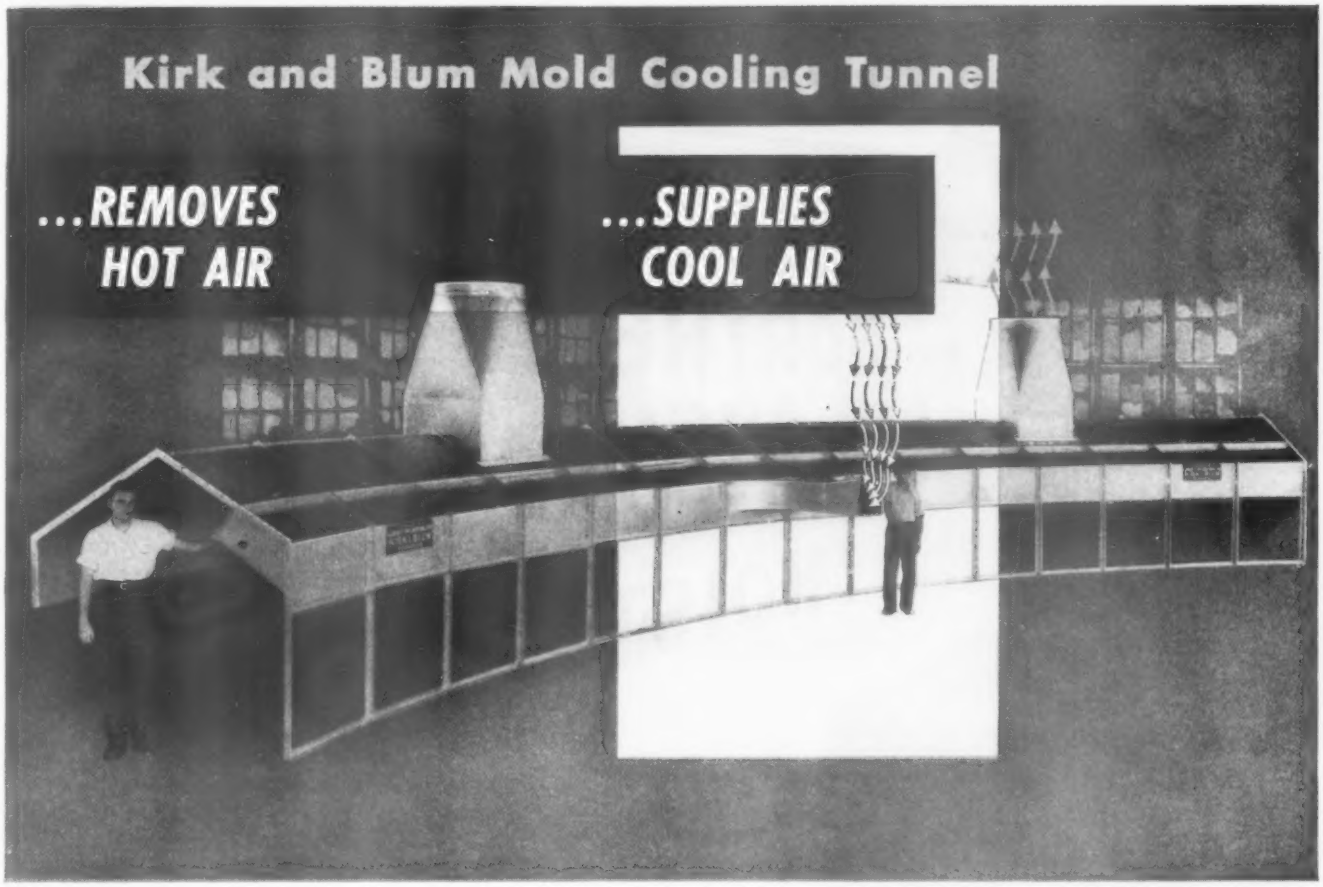

The early bird gets frozen

soil pipe castings. He said nothing about the potential market, the available material for charging the cupola, how he proposed to dispose of the castings, or many other factors which naturally exert a direct bearing on the proposition. Here, just relax where you are and I shall read you the correspondence. First the citizen's inquiry:

Can you give us a list of standard weights and dimensions for soil pipe and fittings. We also shall appreciate information on the following points: 1.—Address of the American Society of Sanitary Engineers. 2.—Mixture of tar and pitch in which the castings are dipped. 3.—Do the majority of foundries use green or dry sand cores? 4.—If dry sand, how is the corebox made? Comment on other features will be appreciated.

I wrote him at considerable length: —Practically all the questions in your letter have been answered time and time again in THE FOUNDRY, either as parts of plant descriptions, or on the pages devoted to specific

(*Continued on page* 214)




SOLUTION to the problem of efficiently cooling castings and at the same time, removing hot air, is illustrated here in the plant of National Malleable & Steel Castings Co., Indianapolis, Ind. The "quarter-circle" of hood is supplied with a built-in duct which supplies cool air all along the mold cooling conveyor. This air, drawn from outside the foundry, picks up heat from the castings and is then exhausted outside the building. The hood is supported on just one side so there is minimum interference with trucks on the "aisle side" and cleaning is made easier.

Engineering ingenuity such as this is just one reason why plants . . . large and small . . . in every industry depend on KIRK & BLUM for efficient cooling and dust and fume collection. The 40-year store of experience behind KIRK & BLUM engineering, fabricating and installation service is yours to command; refer your air-handling problems to KIRK & BLUM.

*Designed, Fabricated and Installed by Liberty Engineering, Div. Kirk & Blum, Indianapolis, Ind.*

FOR CLEAN AIR . . . THE INVISIBLE TOOL

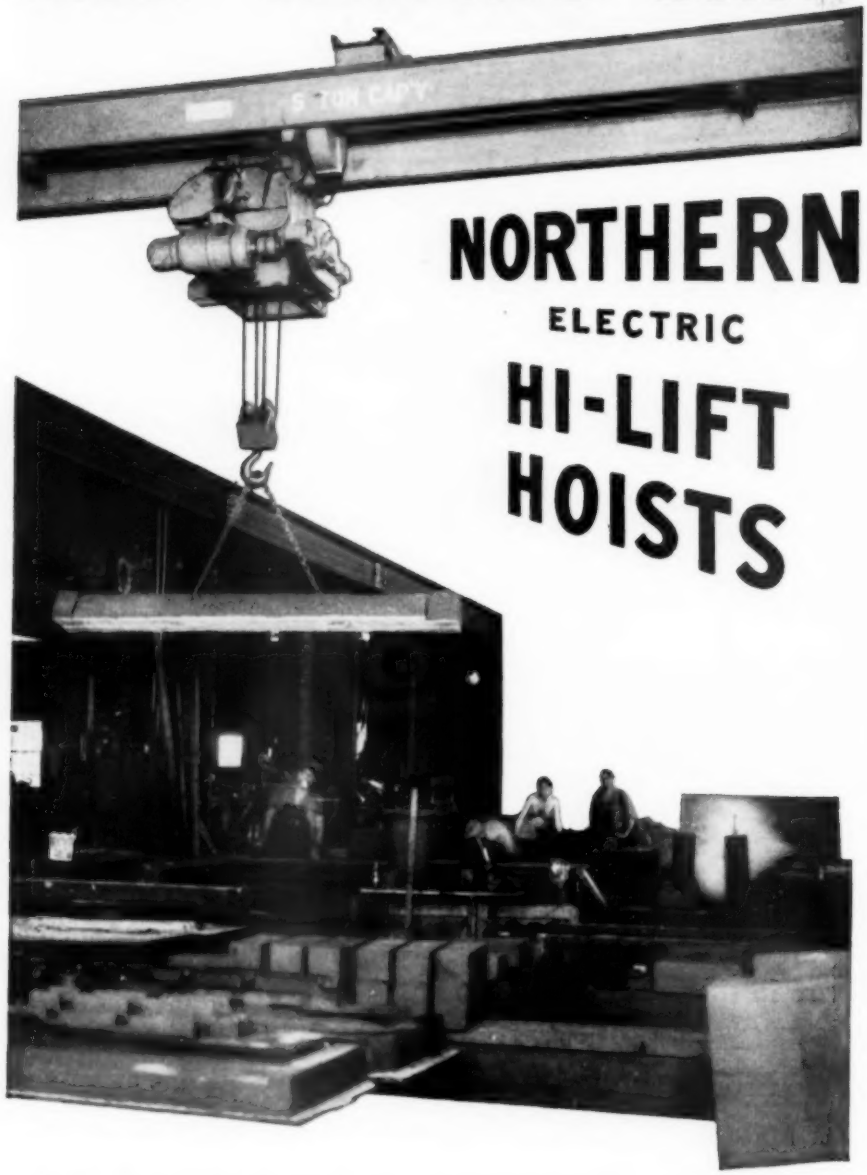
KIRK AND BLUM

DUST AND FUME CONTROL SYSTEMS

**THE KIRK AND BLUM MANUFACTURING COMPANY**

**2808 Spring Grove Ave. ● Cincinnati 25, Ohio**

# labor SERVING hoists




NORTHERN
ELECTRIC
HI-LIFT
HOISTS

## MEAN BETTER HOUSEKEEPING

**Neat stacking of work, free straight aisles, cleaner floors, orderly arrangement of work for better visibility and supervision, means better foundry or shop efficiency. MECHANIZE with LABOR SERVING NORTHERN ELECTRIC HI-LIFT HOISTS to make good housekeeping easier.**

★ Let us send Bulletin No. 135-H ★

OVERHEAD ★ ELECTRIC CRANES ★ AND HOISTS ★

NORTHERN ENGINEERING WORKS
2615 Atwater St., Detroit 7, Mich.


(*Continued from page* 212)

questions from subscribers. If you have a back file you will find a soil pipe reference of some kind in nearly every issue. In the event that you have no back copies the following brief comment may serve your present purpose—

1. According to our records James A. Walker, City Hall, Waterbury, Conn., is the secretary of the American Society of Sanitary Engineering.

2. The American Society for Testing Materials, 1916 Race St., Philadelphia, 3, has the following reference to the coal tar pitch coating in universal use among pipe makers: "When pipe or fittings are to be coated, coal tar pitch shall be used, which shall contain sufficient oil to make a smooth coating. The pitch shall be tough and tenacious when cold and not brittle nor having any tendency to scale. The varnish shall be heated to about 300°F and shall remain at this temperature during the time the casting is immersed. Each casting shall be heated to a uniform temperature of about 300°F immediately before it is dipped and shall possess this temperature at the time it is put in the bath. Each casting shall remain in the bath at least 2 minutes. Fresh pitch and oil shall be added when necessary to keep the mixture of the proper consistency and the bath shall be emptied of its contents and refilled with fresh pitch whenever the accumulation of sand or carbonaceous matter renders this desirable as can be seen by the solids adhering to the under side or lower ends of the castings. After being coated the pipe and fittings shall be carefully drained of all surplus varnish."

Out in the shop this ponderous language will be translated and shortened to:

"Stick 'em in the furnace and heat 'em to about 300. Then dip 'em in the tank and leave 'em there at least 2 minutes. Then hang 'em up and let 'em drain until they're dry."

3. It is not a question of majority choice. All American foundries engaged in the production of soil pipe, straight lengths and fittings, use green sand cores. In foreign literature occasional reference is made to dry sand or half and half dry and green sand cores for the fittings. Green sand cores for the regular straight castings are not made in a corebox. They are swept (foundry term) on steel or cast iron barrels or arbors. The barrels singly or in pairs are revolved slowly under a stream of sand falling from an overhead hopper. In small installations

(*Concluded on page* 216)

# JUNIATA

## The Universal Foundry Sand

The Great Lakes Line includes the exact product to help you solve your casting problem.

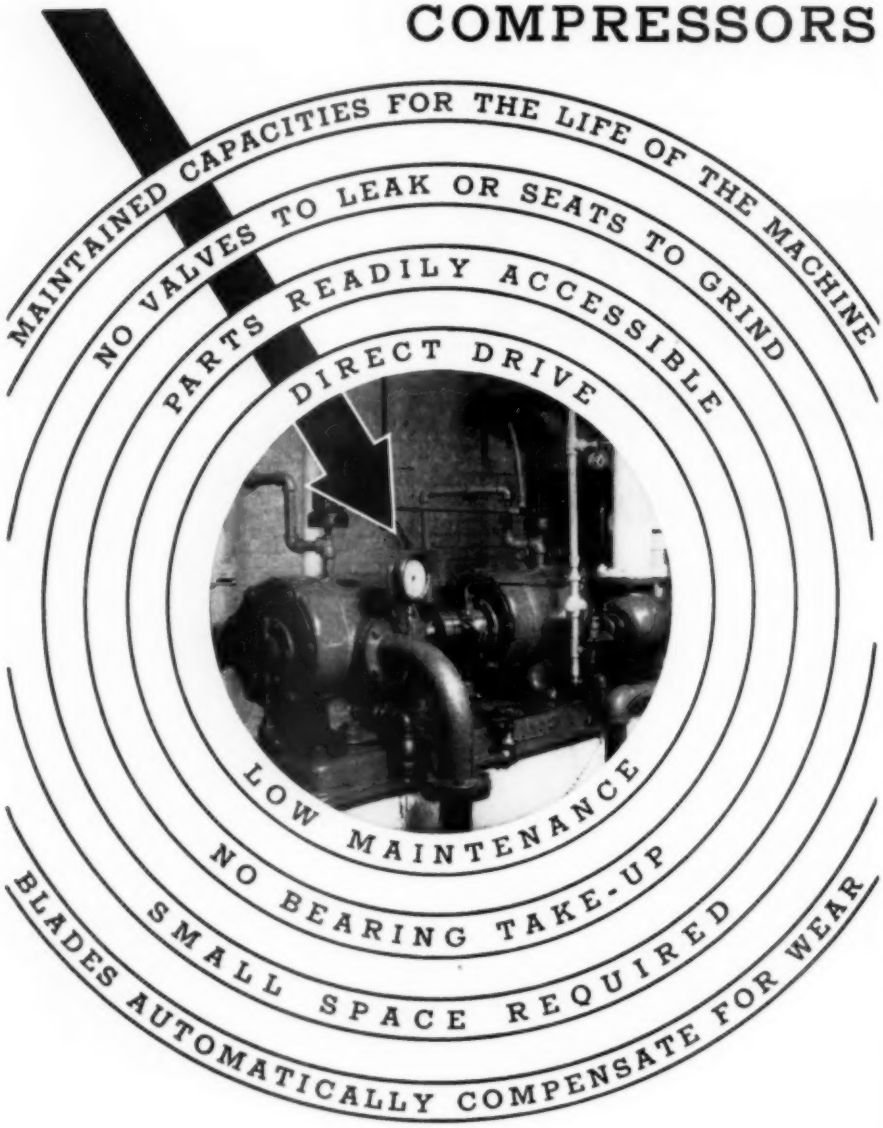
| | JUNIATA FINE | JUNIATA COARSE |
|---|---|---|
| A. F. A. Fineness | 102 | 87 |
| Grain Distribution | 70 | 76 |
| A. F. A. Clay Content | 1.5% | .9% |
| Base Permeability | 40 | 44 |
| Permeability at 3.5% Moisture | 80 | 110 |

**NATURAL OR ARTIFICIALLY DRIED**

*Write us for full details*

**GREAT LAKES FOUNDRY SAND CO.**
UNITED ARTISTS BLDG. • DETROIT 26, MICH.
*Miners, Processors, Foundry, Metallurgical and Sand Blast Service*

# Hitting the Mark...
# FULLER ROTARY COMPRESSORS


MAINTAINED CAPACITIES FOR THE LIFE OF THE MACHINE
NO VALVES TO LEAK OR SEATS TO GRIND
PARTS READILY ACCESSIBLE
DIRECT DRIVE
LOW MAINTENANCE
NO BEARING TAKE-UP
SMALL SPACE REQUIRED
BLADES AUTOMATICALLY COMPENSATE FOR WEAR

**Fuller Rotary Compressors differ as radically from the conventional type of compressor as a centrifugal pump differs from the old-line piston pump. They have, in a relatively short period, earned a justifiable reputation as a dependable source of air power, with minimum attention and maintenance, together with sustained efficiencies.**

**They're built for long, continuous service . . . few moving parts: rotor—bearings —blades. Single and two-stage, for capacities to 3300 c.f.m., actual free-air delivery, pressures to 125-lb.**

**Write for Bulletin C-5, illustrating and describing these machines.**

**FULLER COMPANY, CATASAUQUA, PA.**
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C-168

**FULLER**
**A LIFETIME OF NEW MACHINE EFFICIENCY**


(*Concluded from page* 214)

the barrels are revolved by hand.

Shell patterns are provided for making the fittings. In some instances the pattern serves to make mold and core. In other instances with solid patterns the cores are made separately and placed in the molds. The two halves of the corebox may be hinged, or may be separated from each other. In the latter case the two halves are filled with sand and then *booked*. That is, they are joined while in a vertical position, then lowered back to the bench where the upper half of the corebox is removed. The complete core then can be lifted out of the other half corebox.

In the September and October, 1939 issues of THE FOUNDRY Herbert Farr presented an unusually complete and detailed account of soil pipe making by several methods ranging from the crude two-man team producing 65 flasks per day, up to the mechanized plants where the stray visitor doubted the evidence of his own eyes. Recently several foundries have been producing soil pipe castings by the centrifugal method. A detailed, illustrated description appeared in the July, 1948 issue. The March, 1949 issue describes a newer type machine for this type of work.

4. Headquarters of the Cast Iron Soil Pipe Association is the Empire Building, Birmingham. This is the logical place to send inquiries connected with any features of the soil pipe industry.

"And if any person rides up in a rubber tire buggy," he waved one hand in dismissal, "you can tell him with a reasonable amount of truth that I am thinking of taking a gander around Nova Scotia. I should like to look at some of the places I missed the first time."

---

## Discusses Isotopes

The 1948 American Society for Testing Materials Edgar Marburg Lecture, "Isotopes and Their Application in the Field of Industrial Materials," by Dr. Paul C. Aebersold, chief of the Isotopes Division, Atomic Energy Commission, has been published in the form of a 28-page booklet. It is available from ASTM headquarters, 1916 Race St., Philadelphia 3, at $1.

Dr. Aebersold discusses general research dividends, useful atomic power, induction of chemical and physical effects, and finally in some detail the applications of radioactive and stable isotopes.

# GET ALL FOUR *with* HYDRO-BLAST

## CLEAN CASTINGS CLEAN SAND CLEAN AIR

## *. . . and* A GOOD, CLEAN PROFIT

- **clean castings**

  This is the primary function of Hydro-Blast—to clean castings. It does so, exceedingly well; does it efficiently, quickly; speeding production and cutting cleaning costs, achieving handsome savings that can quickly repay the whole cost of installation.

- **clean sand**

  The washing action of Hydro-Blast *cleans sand*—always improves it, and in a great many instances makes it *good as new.*

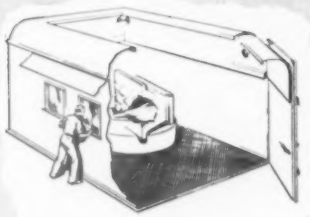
  Most Hydro-Blast users report substantial savings in sand cost as an added factor in quickly paying for the Hydro-Blast.

- **clean air**

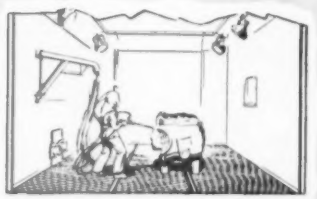
  Here is a vital by-product of extraordinary value: within half an hour after Hydro-Blast operation is begun, the dust concentration in the air within 50 feet of the Hydro-Blast is lessened by 50 percent.

- **and a good, clean profit**

  You can get all four. How to get them is worth investigating—still more richly worth enjoying. There's a simple way to start—ask us.

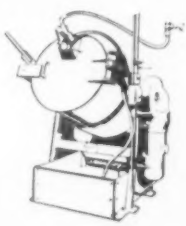


**OPERATOR OUTSIDE**—for cleaning heavy deeply cored castings by means of high capacity equipment, mechanically mounted.



**OPERATOR INSIDE**—an efficient low cost method of cleaning deeply cored castings; for production and custom foundries.

**HYDRO-BLAST CABINET**—excellent for cleaning small, intricately cored castings requiring special attention.



**HYDRO-BLAST BARREL**—a wet tumbling process, highly effective and economical for cleaning many small castings.

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*Chicago 47, Illinois*

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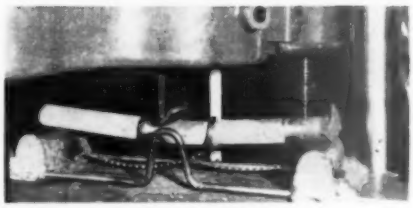
THERE MUST BE
A REASON WHY...

DURA-STIX
FIREBRICK CEMENT

has maintained an enviable reputation for faithful service in the foundry for over twenty five years

KEYSTONE REFRACTORIES COMPANY
120 Liberty St. New York 6, N. Y.

# PROGRESS REPORT ON NODULAR IRON



(*Continued from page* 115)

tensile strength of about 30,000 psi and no measurable ductility. As is also known, normal gray iron possesses moduli of elasticity in the range of approximately 13-19 million with even very high strength irons not exceeding about a 20 million modulus, as opposed to approximately 24 million in the case of the present nodular irons. Incidentally, no decrease in modulus was observed on annealing the nodular iron.

Fig. 7 illustrated a 2-in. diameter bar of nodular iron in process of transverse testing. The very definite plastic deformation undergone by this bar before failure is obvious. Fracture of this same bar is compared with the fracture of a normal flake graphite bar of the same composition in Fig. 9. The typically ductile fracture of the nodular iron shown at the top, as opposed to the comparatively brittle path of fracture of the flake graphite bar, is at once evident. Incidentally, deflections of the order of 2 in. on an 18-in. span were shown by these 2-in. bars previous to fracture. It is results of this type that are so startling to both the gray iron foundryman and to users of conventional gray iron products.

### Hot-working Tests Successful

Gray irons with a nodular graphite structure at least theoretically should be more amenable to hot-working than gray irons containing normal flake graphite. This proved to be true in actual tests, and at the top in Fig. 8 is shown a $\frac{1}{2}$-in. bar that was successfully rolled to the 5/16-in. diameter rod immediately below it. The final rod, although showing some fins due to poor rolling technique, was free from cracks and seams. Beneath these two specimens is shown a $1\frac{1}{8}$-in. diameter cast bar. This bar was successfully reduced to 5/16-in. plate free from cracks or edge checking, as shown by the two bottom views. In both cases the cast specimens were heated for two hours to 1750° F and soaked at this tem-

(*Continued on page* 220)

# KEOKUK-WENATCHEE NOW ONE!

Chief Keokuk, the Indian Country's most eligible bachelor, has at last captured the heart and hand of the Redmen's favorite pin-up princess, the Wenatchee herself. Keokuk, mighty hunter, fearsome warrior, utterer of great metallurgical truths and his charming bride are shown in the informal candid photograph above. The couple is even now off on a honeymoon trip by covered wagon. The Chief claims his bride can average a five-mile-an-hour speed at the yoke if her new moccasins don't pinch her feet.

## THE TOWN PRATTLER COLUMN

*by Chief Running-at-the-Mouth*

**Chittum-Chattum on Keokuk Wenatchee Wedding:** While the Big Chief and his lovely Princess were double-trailing it, the Keokuk Electro-Metals Company of Keokuk, Iowa, proudly established a new plant at Wenatchee, Washington. Wigwam news sources, known to be reliable, tell your copperskinned correspondent that the new division plant will begin at once manufacture of the famous ELECTRO-SILVERY pigs and piglets there in the heart of the Northwest's power-rich Inland Empire.

A late news flash on our private *tom-tom ticker* confirms the good word that these new facilities will practically double Keokuk's electro-silvery output and will permit stockpiling for improved shipping services throughout the West and Midwest.

Wenatchee, which the paleface translates as "Foot of the Rainbow," will now shoot out those silvery pigs and piglets from the shores of the Columbia River apple country while the Keokuk plant at the other end of the rainbow will continue shooting out an expanding silvery stream into the midwest and south. On the way to their ermine-trimmed nuptial wigwam the bridal couple was overheard to remark (and this is exclusive), "Heap big pile of pigs! Ugh!" (For paleface readers "Ugh" is translated "WOW!")

*60-lb. pigs for steel plants*

*30-lb. pigs and 12½-lb. piglets for foundries.*

**KEOKUK**

**electro-silvery**

BY KEOKUK ELECTRO-METALS COMPANY

KEOKUK, IOWA

WENATCHEE DIVISION, WENATCHEE, WASHINGTON

**SALES AGENTS:** MILLER AND COMPANY, 332 S. Michigan Avenue, Chicago 4, Illinois. Cincinnati 2, Ohio, 3504 Carew Tower · St. Louis 1, Mo., 407 N. Eighth St.

Experience is the best teacher
A trial of
20th CENTURY
BLAST pays off!
It is truly amazing, the way 20th Century Blast Shot and Grit resist the intense shattering of high pressure and high velocity.
This durability pays off by more efficient cleaning, slower break-down of shot and grit sizes, and consequent longer periods between abrasive additions or replacements.
Scientific heat treating process gives the right temper for every need.
All screen sizes . . . IMMEDIATE SHIPMENT whether you require a few bags or a car load.
20th CENTURY BLAST SHOT • GRIT
Have you ever seen greater uniformity?

**THE CLEVELAND METAL ABRASIVE CO.**

**Main Office and Plant: 880 East 67th Street, Cleveland 8, Ohio**

***Howell Works—Howell, Michigan***


(*Continued from page* 218)

perature for two hours previous to hotworking.

Forging tests were equally successful. Very little, if any, solution of the graphite nodules appeared to have taken place at the hot-working temperature, and properties distinctly superior to those of unworked nodular iron were exhibited. For example, ultimate strengths of the order of 140,000 lb, with Izod impact values of 25 ft-lb on unnotched 10-mm square specimens, were noted. All the irons illustrated were produced using the previously described cerium treatment.

Despite these favorable results, some definite limitations exist at present in the case of the cerium treatment. One is that the iron apparently has to be hypereutectic and should contain a maximum of about 0.03 per cent S and 0.10 per cent P. Further the cost of cerium in the form of mischmetal is comparatively high; that is, about $9 per lb of contained cerium. The writer has discussed this point with some of the cerium producers in this country, and it was indicated that if a large volume demand developed it probably would be possible to reduce the cost of cerium to around $6 per pound.

### Magnesium Treatment Developed

Meanwhile, in the United States, most attention as concerns nodular iron production has been directed to the use of magnesium as a nodulizing element. At least four companies have undertaken extensive development programs in this direction. These companies include the International Nickel Co., the American Cast Iron Pipe Co., the Ford Motor Co., and the Dow Chemical Co.

At the Michigan State College Foundry Conference last fall and at the Birmingham Regional Conference of the American Foundrymen's Society in February of this year, C. K. Donoho of the American Cast Iron Pipe Co. outlined the nodulizing process using magnesium. Structures obtained with the magnesium process very closely resemble those obtained with the cerium process. Figs. 10 through 12, descriptive of the magnesium process, are taken from Mr. Donoho's original report.

Fig. 12 illustrates the typical structure of a magnesium-treated iron as cast and after annealing. This iron was treated with approximately 0.56 per cent magnesium and contians 0.05 per cent residual magnesium. It will be observed that annealing — holding for one hour at

1650° F — has largely eliminated pearlite in the background structure.

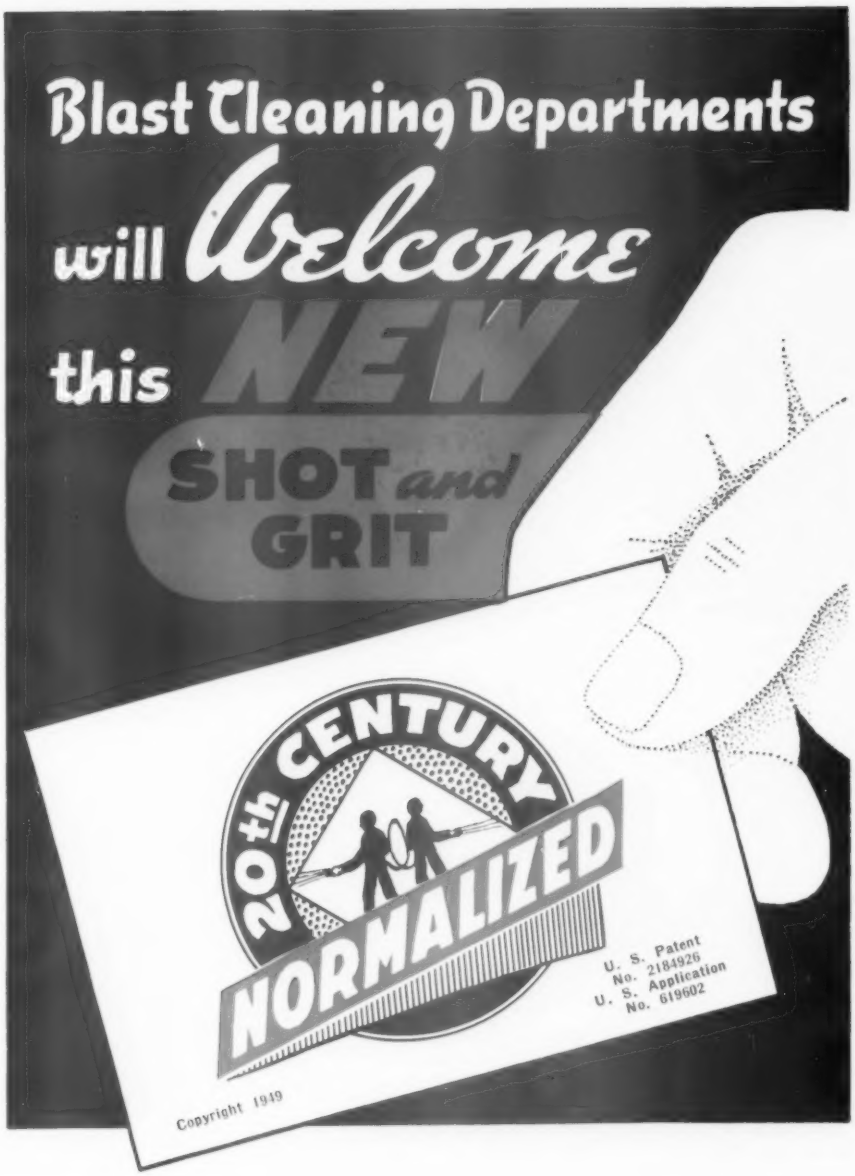
Fig. 10 is of interest in illustrating a suggested method for a foundry undertaking research using magnesium. As can be noted, various quantities of magnesium were added to gray iron, and the resulting properties plotted of arbitration bars cast from these treated heats. In this particular series additions of 0.35-0.55 per cent magnesium produced the best properties, the residual magnesium contents being of the order of 0.05-0.07 per cent. As in the case of cerium, when the optimum amount of magnesium is exceeded there is a tendency for the iron to become white or mottled in structure.

### Has Decided Advantage

The magnesium treatment appears to have one decided advantage over the cerium treatment. If experimental observations can be substantiated, it is possible to treat lower carbon equivalent irons than can successfully be done with cerium, and irons with up to 0.09 per cent sulphur. In the higher sulphur irons, a part of the magnesium is consumed in simply lowering the sulphur content to the desired level. It is still advisable, however, that the phosphorus content be as low as possible if the full strength and ductility of the nodulizing process is to be realized. This is illustrated in Fig. 11. An idea of the properties obtainable through magnesium treatment is given in Table I, which shows the physical properties of both as-cast and annealed specimens of a treated iron.

In the magnesium process, as in the cerium process, inoculation is a necessary step in order to obtain maximum results and to avoid excessive chilling. An addition of 0.40 per cent Si in the form of 75 per cent ferrosilicon was employed by Mr. Donoho.

At this particular point it would probably be well to emphasize the fact that the addition of magnesium to molten iron, except in a very dilute alloy form, is fraught with danger. In his original discussion of the maghesium treatment, Mr. Donoho stated that additions of magnesium to the ladle might not be as disastrous as exploding an atomic bomb, but probably the apparent difference was not too great. As a matter of fact, Mr. Donoho considers that about a 70 per cent Cu—30 per cent Mg alloy is as rich a magnesium alloy as can be safely added to the ladle without special precautions. Even under such circumstances, the addition should be made only to the sur-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face of the metal, and the man making the addition should be suitably protected by fireproof clothing.

From what published information is available concerning the work of other investigators, it would appear that they are using nickel-magnesium alloys containing a maximum of about 20 per cent magnesium. It is known that such alloys are comparatively quiet on addition to gray iron.

Some plants have followed the policy of throwing a section of sheet iron over the ladle immediately after making the magnesium addition, and in at least one case a cover has been immediately dropped over the ladle that partially covers the entire melt. The theory behind this is that most of the absorption of magnesium in the molten iron occurs from magnesium in the vapor phase; magnesium, of course, boils at around 2000° F and burns explosively in air. Solubility evidently varies with the type of alloy employed. Whereas the recoveries from pig magnesium metal or magnesium scrap may be approximately 5-7 per cent, the apparent recovery of magnesium from a 70 per cent Cu-30 per cent Mg alloy is about 15 per cent, and recovery from an 80 per cent Ni-20 per cent Mg alloy is of the order of 25 per cent.

### Numerous Applications Seen

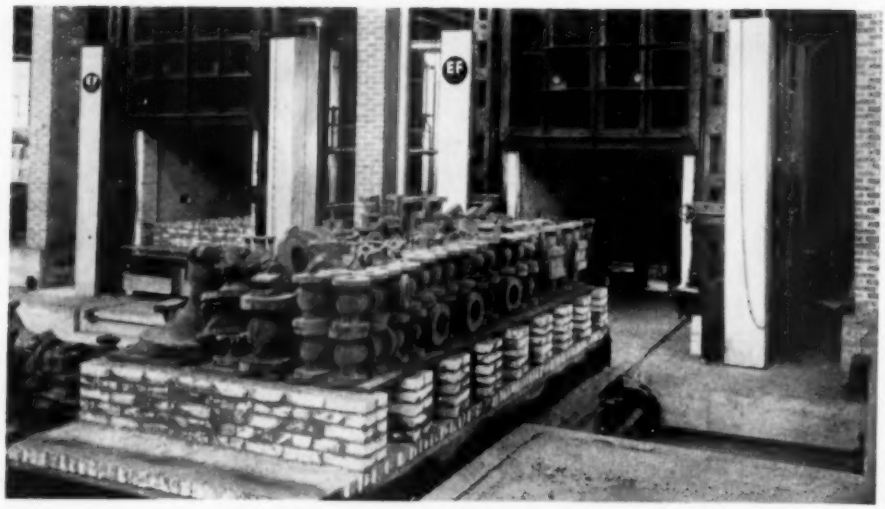
One of the immediate questions arising from this whole development is: When nodular iron is successfully produced on a commercial scale, to what extent will it replace the normal flake graphite type of gray iron? Typical of predictions on this score is a recent news release, which said in part that the potential applications are difficult to prophesy at this early stage of the game. It is anticipated that the automotive, agricultural, implement and railroad industries could employ it in component parts too numerous to mention. Machinery in general, including machine tools, crankshafts, pumps and compressors, valves and heavy industrial equipment, such as rolls and rolling mill housings, could possibly employ it.

Other suggested uses are railroad car wheels; ingot molds; engine, furnace and other parts used at elevated temperatures; pipe; textile machinery; electrical machinery; paper machinery and marine equipment. This list certainly includes a majority of the important existing industrial fields.

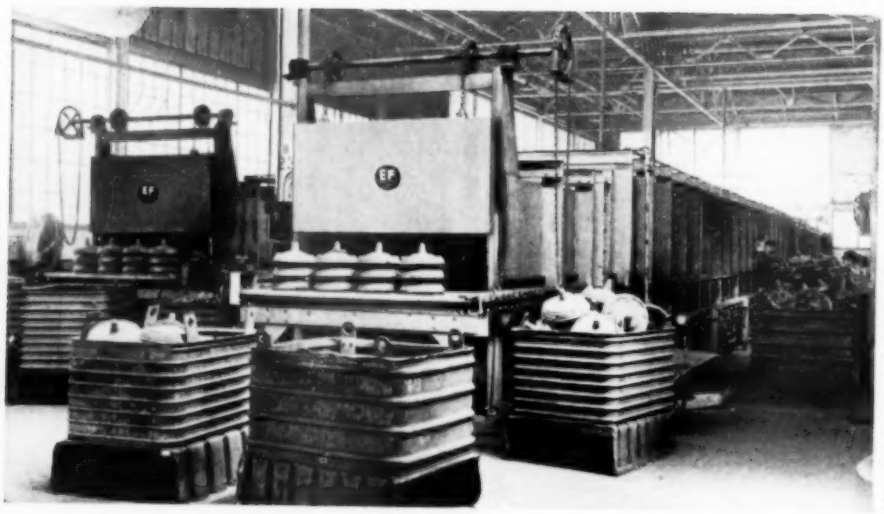
The material, of course, differs from steel as regards castability and other important characteristics. It differs

(*Continued on page* 224)


# EF BATCH TYPE



# AND CONTINUOUS



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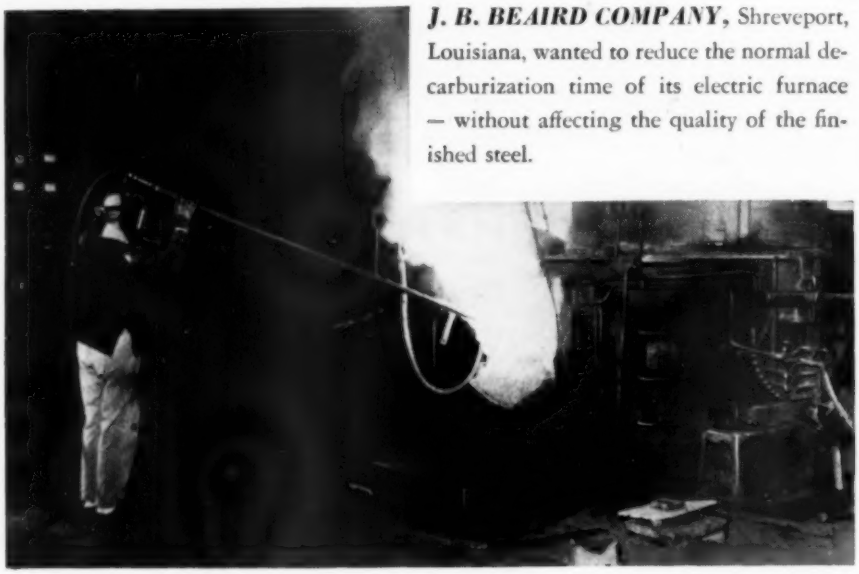

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(*Continued from page* 222)

from malleable iron in that it is gray as cast, the carbon is in the nodular form as cast, and there is apparently no sectional limitation as in the case of the usual malleable iron where flake or primary graphite will be induced.

There are a large number of things that we should know about these nodular irons. A few of them are:

1. Its shrinkage and general founding characteristics.
2. The lasting power of the nodulizing addition, as it is known that a reversion to flake graphite form occurs on holding nodular iron in the ladle.
3. Effect of special proprietary inoculants (such as SMZ, Graphidox, CaSi, Nisiloy, etc.) or new inoculants that may extend the lasting power.
4. More information on the effect of heat treatments and alloys on the properties of nodular iron.
5. More about the steps necessary in translating experimental or pilot information on these irons into regular commercial operation in a foundry.
6. Methods of adding nodulizing alloys, such as magnesium, so as to avoid explosive reactions or introduction of excessive amounts of nonreactive material.

It might be of interest to compare some of the apparent advantages and disadvantages of nodular and flake graphite irons. The articles by Morrogh and Grant in the November and December, 1948 issues of THE FOUNDRY are of a help in this regard.

An attempt to put this comparison in tabular form is shown below. It must be realized, however, that to some extent any comparison is tentative and necessarily partly a matter of personal opinion. This is true both because nodular and flake graphite irons can vary widely in character and specific comparative data are lacking in many cases.

| Property | Nodular Fe | Flake Graphite Fe |
|---|---|---|
| (X denotes the material considered superior) | | |
| Fatigue | X (1) | |
| Damping Capacity | | X (2) |
| Hardness | X (3) | |
| Strength | X (4) | |
| Ductility | X (5) | |
| Wear | | X |
| Heat Resistance | X | |
| Machinability | | X |
| Castability | | X |
| Non-Deforming (Flame Hard. etc.) | | X |

Section Sensitivity X (6)
Low Cost ..... X (7)

(1) Higher strength and consequently higher fatigue strength.

(2) Damping capacity about one-fourth that of flake graphite iron.

(3) Generally higher hardness but not higher than a flake graphite alloy iron of equally high strength.

(4) Two to four times the strength of flake graphite irons.

(5) Up to 7 to 8 per cent elongation as cast and up to 20 per cent as annealed.

(6) Loss in strength on increase in section less with nodular irons but sensitivity to chilling may be equal or greater.

(7) Cost of nodular irons higher because of special addition elements, costly raw materials, etc.

It might also be of interest to compare the cerium nodulizing treatment as opposed to the magnesium treatment, since today these two types of treatment are the only ones that seem to give definite promise of commercial success.

First, as concerns comparative cost, if it is assumed that in large quantities cerium can be obtained for $6 a lb, it would cost about $20 a ton to add 0.15-0.20 per cent cerium to gray iron. In the case of magnesium, assuming an alloy such as 70 per cent Cu-30 per cent Mg or 80 per cent Ni-20 per cent Mg were necessary, the cost would be about the same at a quoted price of 75 cents a pound for the copper alloy and $1 a pound for the nickel alloy. Magnesium added in the latter case presumably would run as high as 0.50 to 0.60 per cent.

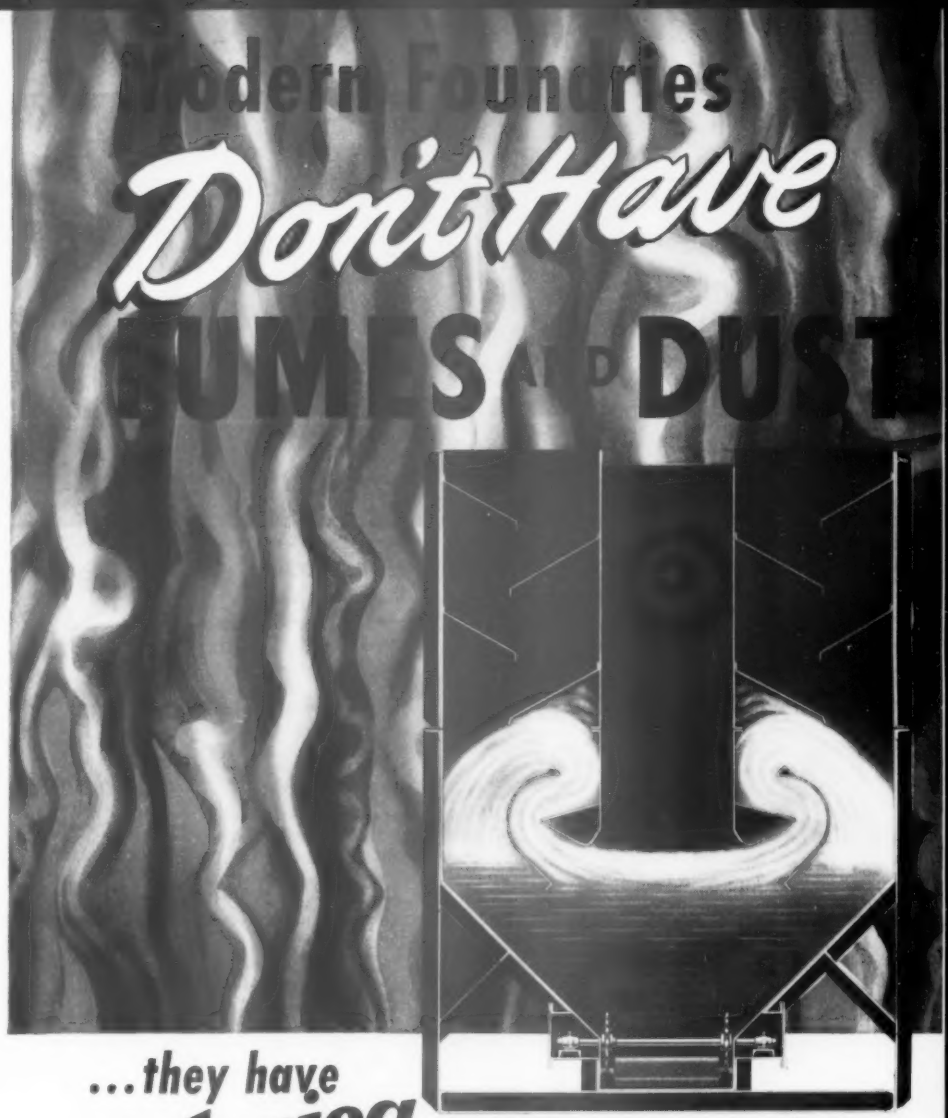
### Less Tendency To Chill

Although there is at present more or less of a stand-off as concerns material costs, cerium possesses one advantage in that it can be added as a comparatively rich alloy (50 per cent or more cerium), and consequently has less tendency to chill the iron on addition. Probably more important, it is not of an explosive character and no danger is associated with its use. In the case of magnesium, it is considered necessary to use a very dilute alloy (20 per cent magnesium or perhaps under for full protection) which means an increased tendency to chill the treated iron, and a build-up of around 2 per cent Ni or Cu in the final iron. With recirculating scrap the gradual increase in nickel and copper contents due to this means may become a problem.

As concerns the base composition

(*Continued on page* 228)

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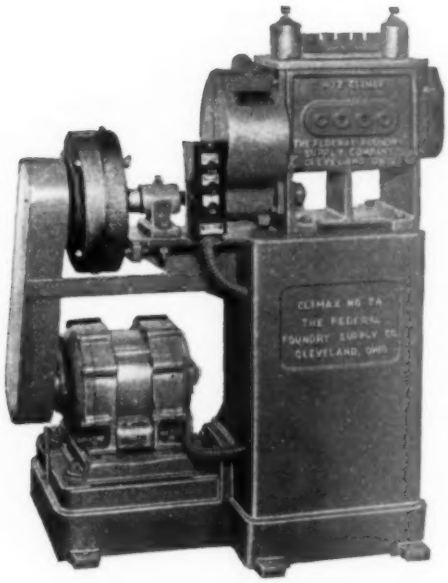

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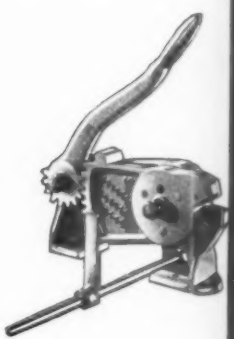

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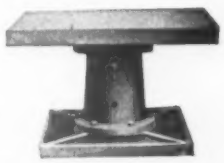

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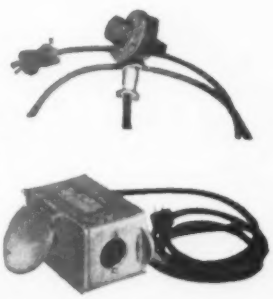

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(*Continued from page* 225)

of the treated irons, high carbon equivalent is essential in the cerium process. It is not so essential in the magnesium process, although most of the irons reported to have been successfully treated with magnesium tend to be at a 3.9 per cent or higher carbon equivalent. It might be observed in this regard that if high shrinkage and the use of special precautions to combat such shrinkage are to be avoided, it is desirable that the total carbon content be in excess of 3.5 per cent even in the magnesium-treated irons.

Again comparing the two processes, low phosphorus is desirable in the case of both treatments if high strength and ductility are to be developed, and apparently is very essential if nodular formation is to be obtained through the use of cerium additions.

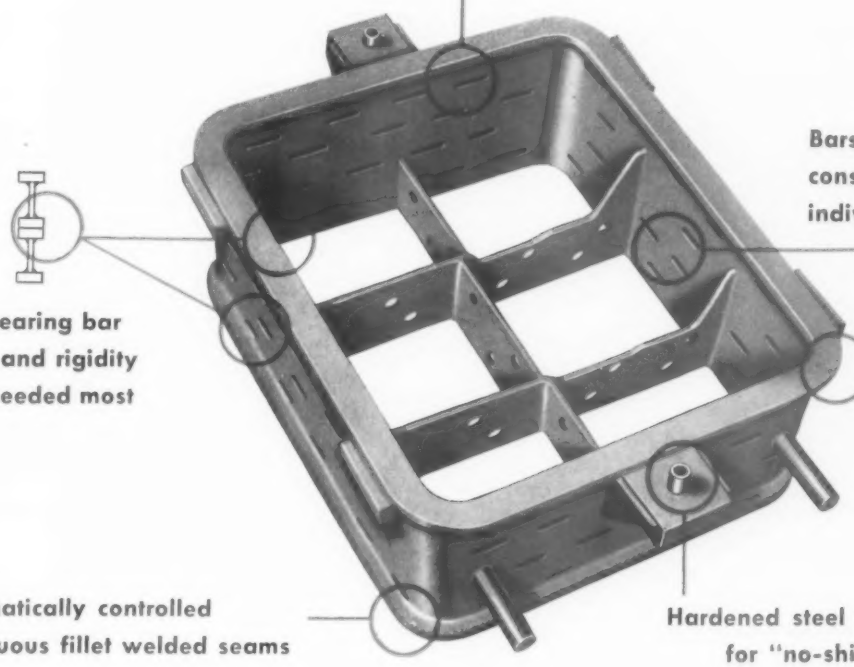
### Sulphur Must Be Low

As concerns sulphur level, this, at the present time, represents one of the main limitations in the cerium process. Although sulphur can be reduced by materials such as fused sodium carbonate, it is frequently inconvenient to apply an initial desulphurizing treatment in addition to the nodulizing treatment. However, this may not act as a final limitation on the cerium treatment. Very interesting results, for example, have been obtained experimentally using calcium carbide as a constituent of the cupola charge or blown into the molten metal. Interesting tests have also been run on the use of basic-lined cupolas and ladles. Unusually high carbon contents and low residual sulphur have been reported to result from such processes. As previously noted, Mr. Donoho reported that in using magnesium, irons containing up to 0.09 per cent S have been successfully treated, although additional magnesium, sufficient for the desulphurization, has to be included in the addition.

**Conclusions**—To advance the nodular process as rapidly as possible, it is obviously important to the cast iron industry that as many companies and individuals be working on this process as possible. Rapid technical advancement is also essential because consumer pressure for this raw material is already being felt, and can naturally be held in check only so long. The military or strategic importance of the development is likewise obvious in that structural materials of probable military importance could be produced in several

(*Concluded on page* 230)

# THE REASONS WHY *Industrials'* THE BUY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*(Continued from page 228)*

thousand widely scattered locations.

It is only fair to prospective workers in this field to conclude this progress report with a definite warning. The explosive character of magnesium or of magnesium-rich alloys cannot be overemphasized. They should never be added in such a way as to vaporize beneath the metal surface or to permit solid particles to be carried down below the surface by the action of a metal stream. Blowing out of molten metal from the ladle is an almost certain result, and very serious accidents could result. Approximately a 30 per cent magnesium alloy is probably the richest that can be added without very special precautions.

It should also be stressed that the patent situation in the case of nodular irons at present is confused, with at least four companies and individuals reported as having been applying for patents.

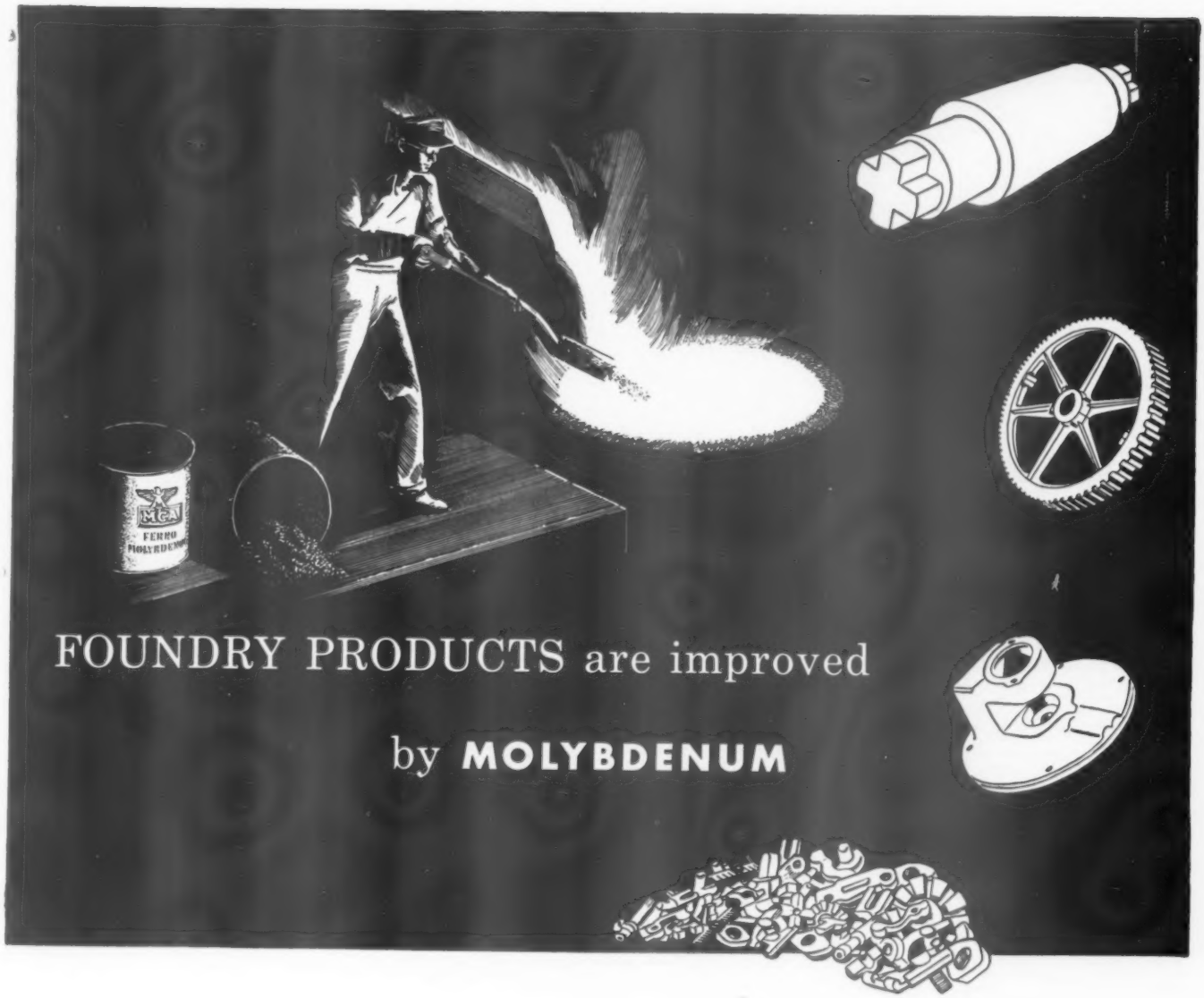
## Foundry Book Wins Special Award

The *Development of the Metal Castings Industry* by Bruce L. Simpson, a book tracing the castings industry from its beginnings to the 20th century, has been selected as one of the "50 Books of the Year" in competition recently sponsored by the Institute of Graphic Arts. The book was included in an exhibit held at the Congressional Library, Washington, in April. Simultaneous displays were featured in Chicago, New York and San Francisco.

A second certificate of recognition for superior design and printing was awarded to the publishers, American Foundrymen's Society, by the Society of Typographic Arts. This is an award won at the 23rd Annual Exhibition of Design in Chicago Printing, which named the *Development of the Metal Castings Industry* as one of the three best books produced in the past year.

## Foundry Courses

Tennessee Agricultural and Industrial State College, Nashville, Tenn., is preparing a program which includes establishment of a School of Engineering. Curriculum of the new school will include a 2-year course in basic foundry and a 4-year course in foundry engineering. Frank A. Crossley will be director of the foundry program which is expected to be ready for presentation in the fall of 1950.

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MCA

## Foundrymen Study Air Pollution

An organization of foundrymen has been formed among Chicago industrial executives for the reduction of air pollution in the city. The group is the foundry executives subcommittee of the cleaner air committee of the Chicago Association of Commerce and Industry .

Chairman of the foundrymen subcommittee is James R. Allan, manager, industrial engineering and construction department, International Harvester Co. Other officers include Sil C. Massari, technical secretary, American Foundrymen's Society; L. H. Rudesill, Griffin Wheel Co., chairman of the gray iron subgroup; Fred B. Skeates, Link-Belt Co., converter steel subgroup; W. W. Moore, Burnside Steel Foundry Co., electric furnace subgroup; and Chris Heise, International Harvester Co., malleable iron subgroup. A nonferrous foundry subgroup is also being formed.

Other members of the committee are G. S. Detlefsen, Crane Co., Frank O'Neil, Western Foundry Co., and L. F. Vasser, International Harvester Co.

# NEW YORK STATE CONFERENCE

### *To Be Held at Syracuse, Nov. 25-26*

A NEW YORK State Regional Foundry Conference will be held Friday and Saturday, Nov. 25-26, at Syracuse University, Syracuse, N. Y. Sponsoring the conference will be the Western, Eastern and Central New York and Rochester Chapters of the American Foundrymen's Society, with the co-operation of the College of Applied Science of Syracuse University.

Several meetings have been held by chapter representatives and university officials to make preliminary plans for the conference arrangements. E. E. Hook, Dayton Oil Co., director of Central New York Chapter, has been named general conference chairman; J. F. Livingston, Crouse-Hinds Co., Syracuse, vice chairman of Central New York Chapter, has been appointed secretary, and W. D. Dunn, Oberdorfer Foundries, Utica, N. Y., treasurer of the chapter, has been selected as conference treasurer. L. D. Wright, U. S. Radiator Corp., Geneva, N. Y., is serving as chairman of the program committee, with M. J. O'Brien Jr., Symington Gould Co., Depew, N. Y., vice chairman.

An organizational meeting for the conference was held in Syracuse, Mar. 19, with the following chapter representatives in attendance: Eastern New York, A. C. Andrew, J. N. Wheeler; Rochester, H. G. Stellwagen, Jack Steeves, Max T. Ganzauge, H. B. Hanley, Herman Hetzler; Western New York, J. R. Wark; Central New York, E. E. Hook, L. D. Wright, E. G. White, J. F. Livingston, F. Wheeler, W. D. Dunn, B. Artz, David Dudgeon Jr., J. O. Ochsner, J. A. Feola. Representing Syracuse University were Dr. B. J. Lazan and E. Syrene.

Dr. Lazan pointed out that while the university does not have foundry facilities, it is most interested in being a participant in the coming conference. The tentative program calls for technical sessions Friday morning and afternoon and Saturday morning at the university, dinner Friday evening at the Onondaga Hotel, Syracuse, and luncheons the two days at the school.

PLAN CONFERENCE: Active in arrangements for the forthcoming New York State Regional Foundry Conference to be held at Syracuse University, Nov. 25-26, are these AFS chapter representatives shown at a recent meeting. Seated, left to right: E. E. Hook, Dayton Oil Co., general conference chairman; J. F. Livingston, Crouse-Hinds Co., conference secretary. Standing: Max T. Ganzauge, General Railway Signal Co.; A. C. Andrew, American Locomotive Co., and John R. Wark, Queen City Sand & Supply Co.

## Book Review

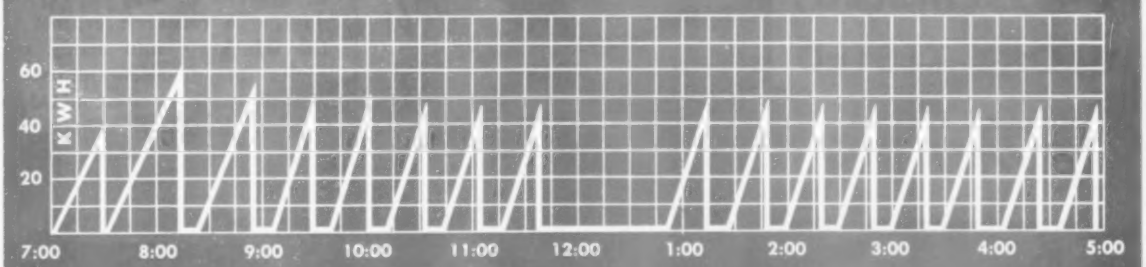
*Mathematics at Work,* by Holbrook L. Horton, 728 pages, 6 x 9 in., published by the Industrial Press, 148 Lafayette St., New York 13. Price $6.

This is a working manual for machine designers, tool engineers, gage designers, mechanical draftsmen technical or trade school students, and teachers. Practical applications of arithmetic, algebra, geometry, trigonometry and logarithms are illustrated by a wide variety of mechanical problems taken from practice. Each problem is presented to show what it is about, how to analyze, formula required, derivation of formula, and solution of typical examples. The book also presents 145 pages of standard mathematical tables, including logarithmic and trigonometric tables.

## Ohio Labor Laws

*State Labor Legislation,* 1937-1947 by Sanford Cohen, department of economics, Ohio State University, Columbus, O., has been published by the Bureau of Business Research, College of Commerce and Administration, Ohio State University. The book is a study of state laws affecting the conduct and organization of labor unions and covers state labor legislation and judicial decisions during the decade 1937-1947.

# DETROIT ROCKING ELECTRIC FURNACE

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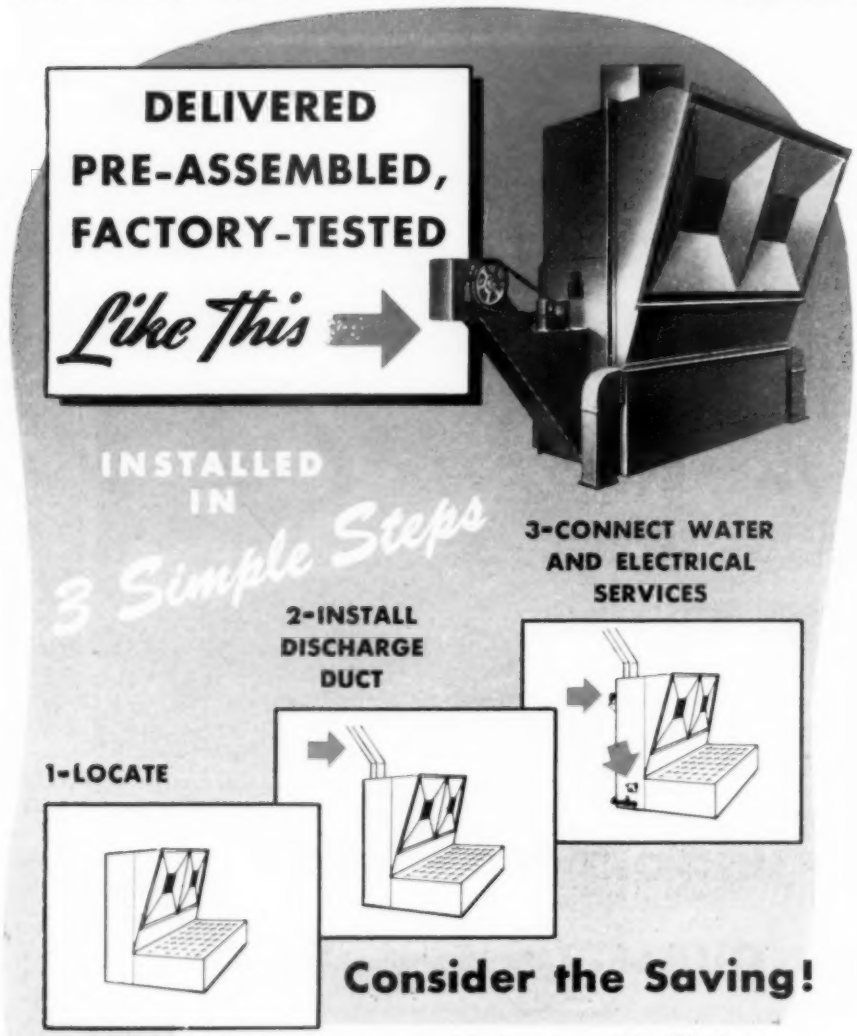


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## Seeks Purer Metal Solutions

Four student chemists in the graduate department of chemistry, Clark University, Worcester, Mass., working under the direction of Dr. Arthur E. Martell of the faculty, are conducting a research project involving the synthesis and study of a new series of chemical substances for altering properties of metal solutions. The students are Albert E. Frost, East Douglas, Mass., and Stanley Chaberek, Richard C. Brown and

DR. ARTHUR E. MARTELL

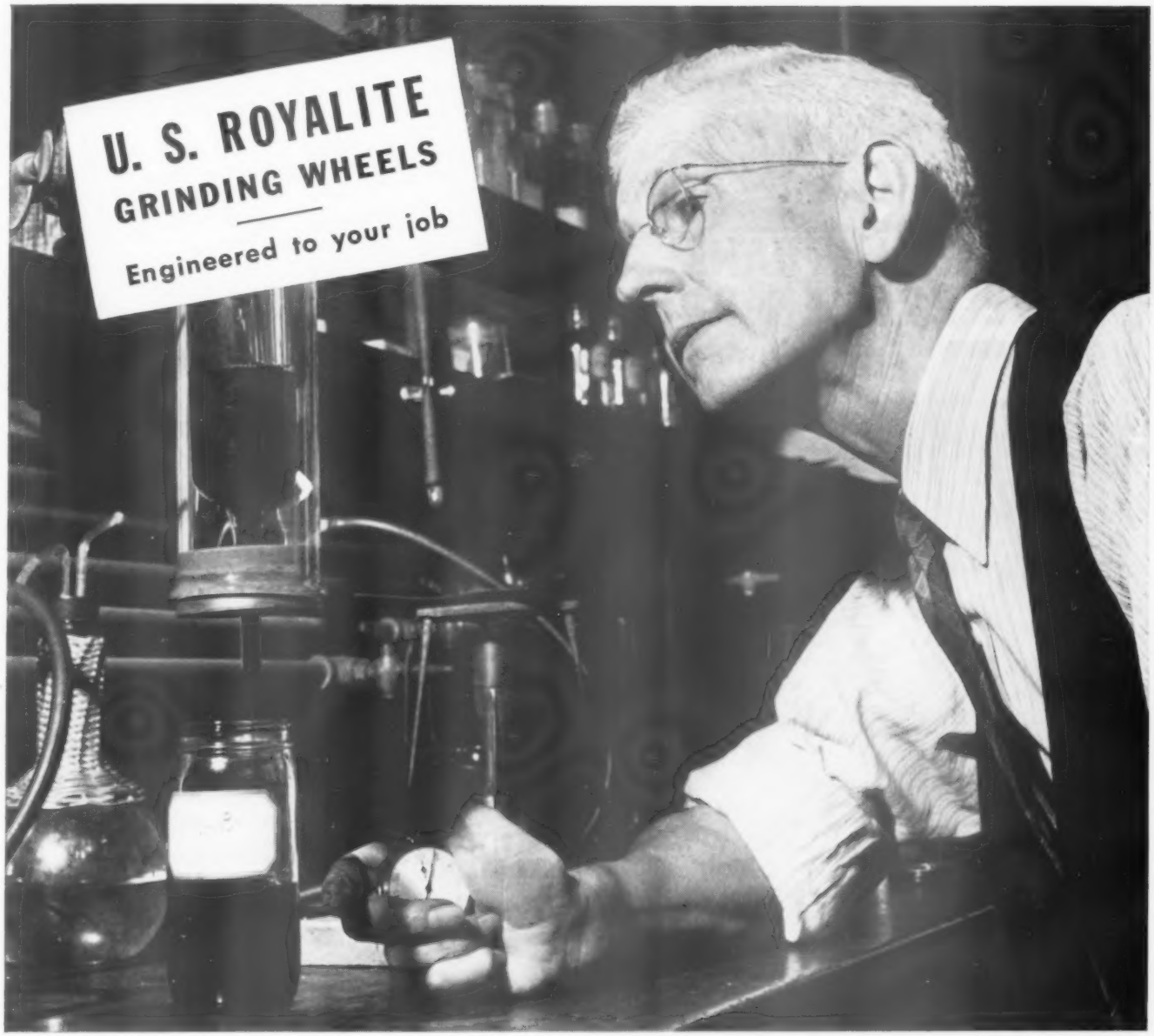
Robert C. Plumb, all of Worcester, Mass., who are seeking higher degrees in chemistry.

The project is being supported in part by grant of funds, chemicals and equipment from F. C. Bersworth, president, Bersworth Chemical Co., Framingham, Mass., producer of sequestering and chelating agents for industry. Mr. Bersworth pioneered the industrial development of aliphatic poly amines and their chelating amino acid salts and derivatives.

New substances under study at Clark University are called sequestering or chelating agents. They offset the undersirable properties of certain metals which occur as impurities in water and in many commercial preparations including liquid soaps, fats, oils, emulsions, sanitizing agents, drugs, food products, textile and metal processing.

## Gray Iron Alloys

Frank Foundries Corp., 2020 Third Ave., Moline, Ill., has published a 32-page booklet discussing the possibilities and uses of "tailor-made" alloyed gray irons. The profusely illustrated booklet is intended as a help in selecting a type of gray iron to meet specific requirements.

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*No Stiff Steel Springs.*

*Oversized Leather Tab at Top* aids adjustment and permits speedy removal—Outward and upward tug on this tab removes legging in an instant.

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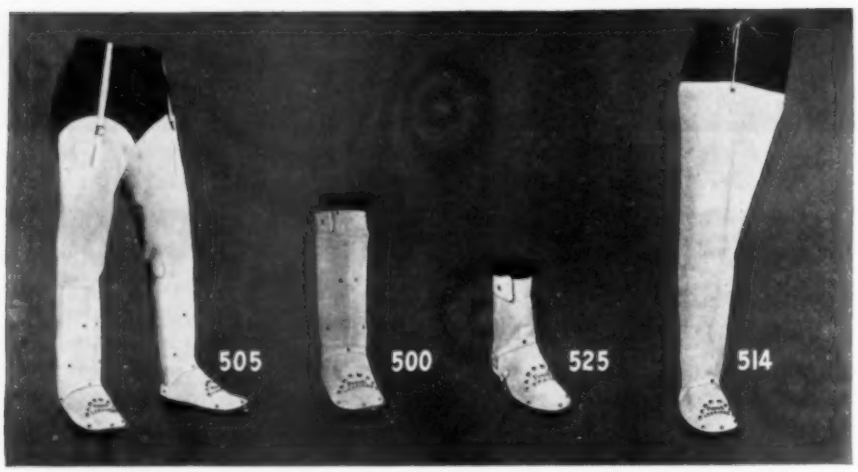


*Knee Leggings*—Described above.

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# Wisconsin Conference Technical Reports

SPACE limitations prevented presentation in the April issue of reports on all of the technical sessions at 12th annual Wisconsin Regional Foundry Conference. Concluding reports are presented here.

Third Steel session was devoted to the "Reproducibility of Mechanical Properties", with W. K. Bock, research engineer, National Malleable & Steel Castings Co., Cleveland, as the speaker. Chairman and co-chairman, respectively, were E. G. Tetzlaff, assistant secretary, Pelton Steel Casting Co., and G. V. Jedinak, chief inspector, Sivyer Steel Casting Co., both of Milwaukee.

The speaker dealt with the methods of determining reproducibility of mechanical properties. In general, three steps were given: 1. Collection of data; 2. Organization of data; and 3. Analysis of data. The first two steps involve ordinary methods, but the third involves use of statistics, and Mr. Bock concerned himself principally with the fundamentals involved. The paper contained graphs and examples to explain the fundamental principles.

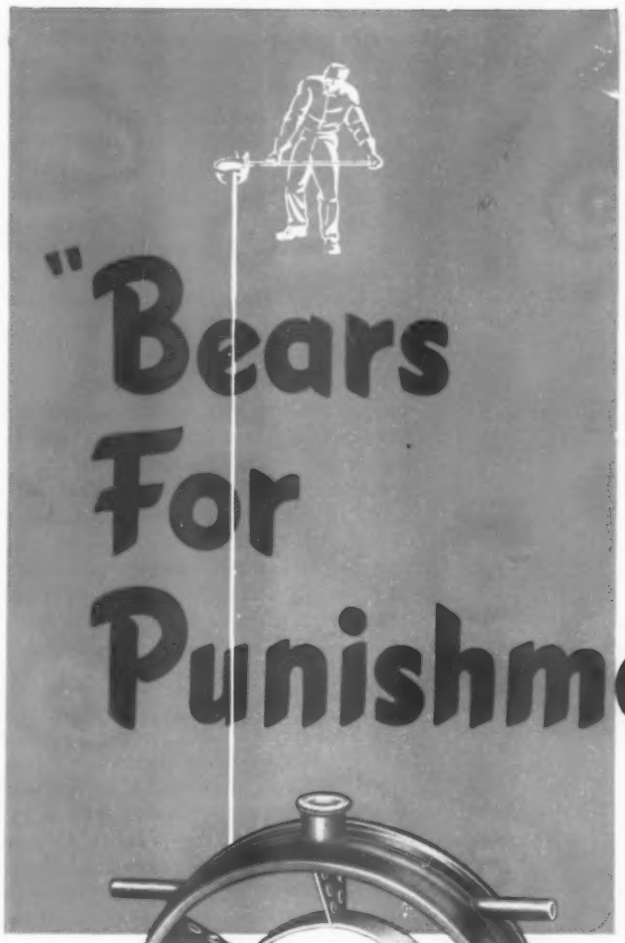
### Discusses Casting Quality

At the concluding steel session, William J. Phillips, director of castings development, Steel Founders' Society of America, Cleveland, interestingly discussed "Improving the Quality of Steel Castings to Offset Substitute Materials." Chairman and co-chairman, respectively, were O. H. Kraft, superintendent of foundries, Bucyrus-Erie Co., South Milwaukee, Wis., and Charles Fuerst, assistant to superintendent, Falk Corp., Milwaukee.

In his introductory remarks, Mr. Phillips said he had a three-fold objective—first, to show where the steel castings industry formerly stood and where it now stands; second, to indicate what should be done to improve the industry standing; and third, to discuss casting quality, management quality and technical quality. In developing his theme, he pointed out that the industry formerly had an unchallenged market. In the past, a customer specified a steel casting for his product; today, the steel casting faces competition of other materials, specifically, forgings and weldments.

To emphasize the latter point, the speaker enumerated numerous parts,

(Continued on page 238)



# "Bears For Punishment"

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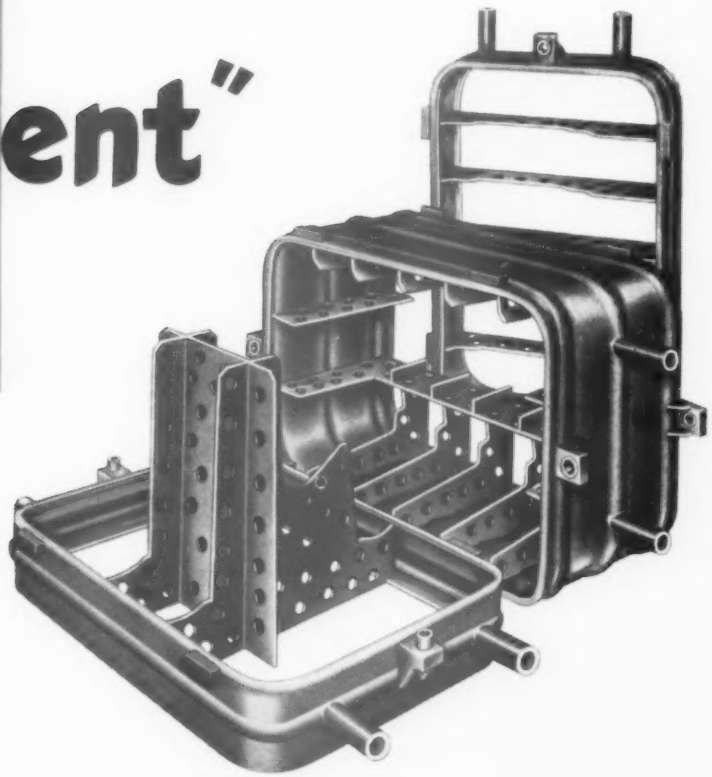

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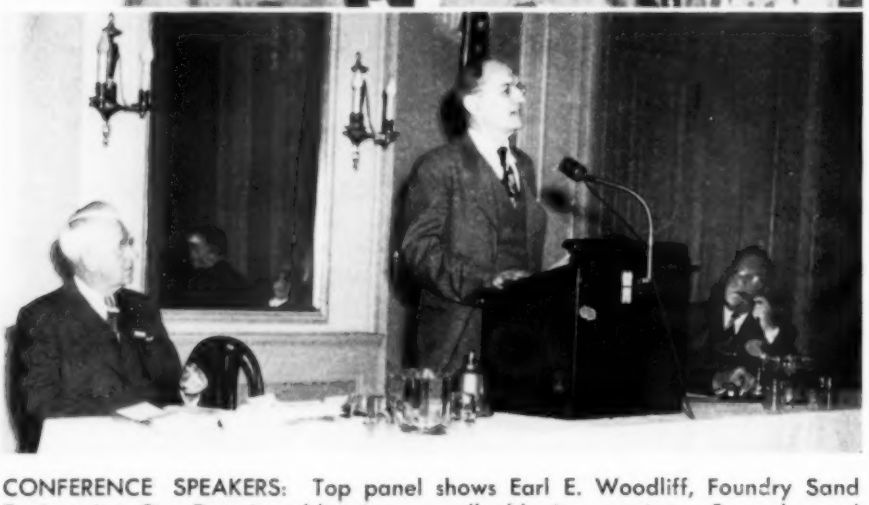

CONFERENCE SPEAKERS: Top panel shows Earl E. Woodliff, Foundry Sand Engineering Co., Detroit, addressing a malleable iron session. Second panel depicts Thomas Kramer, Acme Aluminum Alloys Inc., Dayton, O., a nonferrous session speaker. Arthur L. Grede, Grede Foundries Inc., Milwaukee, is shown addressing a luncheon session in the third panel. At bottom, left to right, are Robert C. Woodward, Bucyrus-Erie Co., Wisconsin chapter president; Dean M. O. Withey, University of Wisconsin, and William B. Wallis, AFS national president

(*Continued from page* 236)

formerly specified as steel castings, but now subject to competition from other materials and other process of fabrication. Inferior quality of castings has had considerable to do with this encroachment. Mr. Phillips contended that co-operative effort can assure the production of good castings. The industry, he warned, must stop production of steel castings by the ton and undertake the production of acceptable semifinished parts by foundry methods.

Proper selection of ingredients and proper mixing and baking procedures are vital if satisfactory cores are to result, according to Erich Welander, metallurgist, Deere & Co., East Moline, Ill., who spoke on "Malleable Core Practice." Chairman of the session was Martin Harder, Lakeside Malleable Castings Co., Racine, Wis., with H. C. Stone, metallurgist, Belle City Malleable Iron Co., Racine, acting as co-chairman.

### Measure Materials Carefully

Mr. Welander's discussion centered around advantages of certain types of core oil, binders and sands in malleable casting work. A consistent method of measuring ingredients should be carefully followed. In selecting core oils, a subject which he discussed at length, Mr. Welander suggested the foundryman pay less attention to chemical specifications; the proof of any oil is the cores it helps produce, he said.

A give-and-take period followed the prepared talk in which a number of troublesome problems were aired and discussed; how to prepare a core sand incorporating high strength and good collapsibility was one of these of particular interest.

Earl E. Woodliff, Foundry Sand Service Engineering Co., Detroit, in a talk, entitled "Things To Consider in Malleable Sand Control," stated that selection and control of the sand mixture in the malleable foundry poses difficulties not found elsewhere; finish requirements are those of bronze while metal temperatures are those of steel.

E. B. Hansen, secretary, Wisconsin Appleton Co., South Milwaukee, and C. M. Lewis, secretary-treasurer, Badger Malleable & Mfg. Co., South Milwaukee, were chairman and co-chairman, respectively.

One serious problem in many malleable foundries is metal penetration into molds and cores. This difficulty, he said results directly from use of low density sand and can be remedied by harder ramming and by broadening grain distribution. Addi-

(*Continued on page* 240)

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(*Continued from page* 238)

tion of coarser sands is as beneficial as addition of "fines" in this connection.

Mr. Woodliff suggested selecting sand by specification rather than by name or number, using a core sand which as it finds its way into the molding sand will produce a better surface finish. He exhibited a chart of grain distribution and used it to point out what proportion of fine and coarse grains should be used for best results. Another chart showing clay and moisture content of various sands also was explained.

### Describes Casting Grinding

The Friday morning session on malleable iron featured a discussion of "Grinding Problems" by A. S. Rakestraw, Norton Co., Chicago. C. M. Lewis, secretary-treasurer, Badger Malleable & Mfg. Co., was chairman and E. B. Hansen, secretary, Wisconsin Appleton Co., co-chairman. Mr. Rakestraw first discussed methods of checking wheel cost which include: By weight of castings ground; by weight of gates removed; by wheel life in hours; by employees' earnings. He stated that any of these methods may or may not provide an accurate means of determining abrasive wheel cost, depending on the uniformity and selection of castings to be cleaned. Whether the metal to be removed is in the form of pointed gates, broad section gates, narrow fins, gates located adjacent to a flange requiring the use of the abrasive wheel corner, or gates and flash easily accessible to the wheel face, has an important bearing on the abrasive cost.

Mr. Rakestraw stated that fillers for a soft iron wheel, made of waxes and resins, usually are effective in minimizing wheel face loading. To be most effective the type of filler having the proper softening points should be selected. He indicated that while a very light dressing is all that is necessary, it is customary in many foundry cleaning rooms to dress the wheel until all discoloration has been removed. This practice is costly and results in no improvement in grinding action over that accomplished by a light dressing.

Where large quantities of castings of wide characteristics are produced, it is possible that overall savings may be made by selecting wheel specifications best suited for each particular material. Otherwise, it becomes necessary to use a wheel adapted to the harder, more sensitive material which may prove to be more costly when used on softer, more ductile

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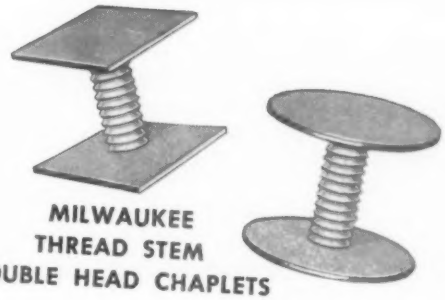

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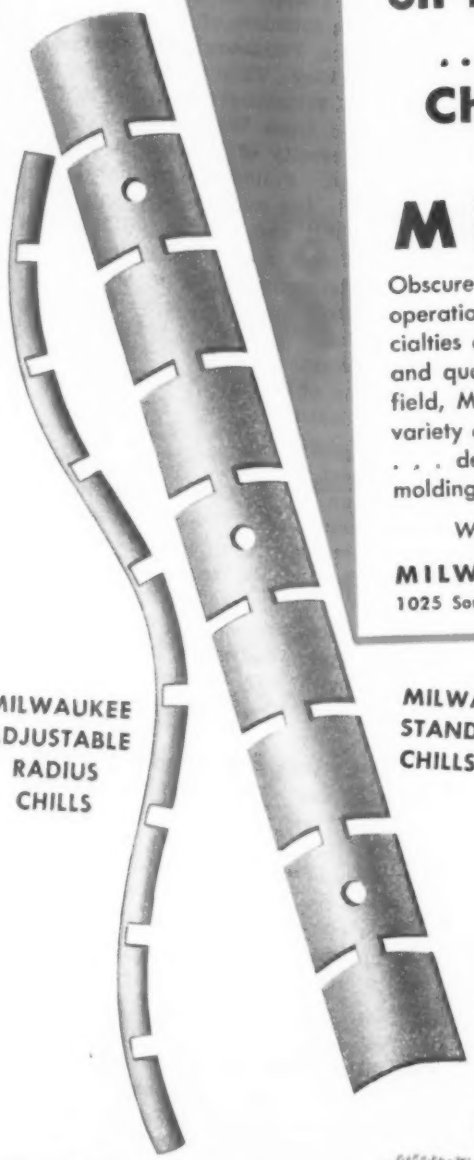

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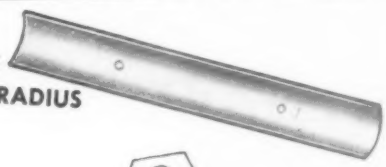

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materials.

Results of investigations to determine effects of oxygen and deoxidation on graphitization of white cast iron were reported by Richard W. Heine, assistant professor of metallurgy, University of Wisconsin, at the closing malleable iron session. Chairman of the meeting was H. C. Stone, metallurgist, Belle City Malleable Iron Co., Racine, Wis., and co-chairman was P. J. Anderson, International Harvester Co.

With oxygen content playing an important role as a retardant to graphitization of white cast irons and with methods of shortening and simplifying the annealing cycle of practical interest to malleable iron foundrymen, various deoxidation treatments may develop into accepted foundry practice. Several distinct applications of deoxidizers in the malleabilizing process were described as follows: Use of deoxidizers to obtain a rapid-anneal, grade B malleable iron; use of small deoxidizing additions to white irons intended as grade A malleable to promote more rapid annealing and more favorable nodule distribution; use of deoxidizing additions to control graphite nodule distribution and number; to compensate for fluctuations in oxygen content of the melt; and to permit utilization of lower silicon-content white irons.

In comparing the results of his experiments with those of other investigators, he observed a striking similarity between the effects of aluminum, titanium, hydrogen and boron additions. Detailing the test methods used, he cited the effects of these additions, pointing out that initial time required for first stage graphitization was decreased. However, certain of the additives, when used in quantities beyond those necessary for complete deoxidation, were found to produce alloying behavior of stabilizing carbides and to retard first stage graphitization.

## Fire-Fighting Movie

Now available for showings to municipal, volunteer and industrial firemen is a new 20-minute, 16-mm sound movie in color, "Fire-Fighting with Wetter Water." The movie, prepared by the Carbide & Carbon Chemicals Corp., illustrates how water made wetter by that company's new product, Unox fire-fighting penetrant, knocks out fires three to four times faster than plain water. Showings by interested groups may be arranged without charge by writing Carbide & Carbon Chemicals Corp., Room 328, 30 East 42nd St., New York 17.

## Meeting Calendar

**May 1—Non-Ferrous Founders' Society,** directors' meeting, St. Louis

**May 2-5—American Foundrymen's Society,** annual convention, St. Louis

**May 12-13—Instrument Society of America,** annual spring meeting, Royal York Hotel, Toronto

**May 16-18—Industrial Manufacturers Association,** annual meeting, the Cavalier, Virginia Beach, Va.

**May 20—Malleable Founders' Society,** eastern sectional meeting, New York

**May 27—Malleable Founders' Society,** western sectional meeting, Palmer House, Chicago

**June 9-10 — Steel Founders' Society of America,** industrial relations meeting, Drake Hotel, Chicago

**June 16-17—Malleable Founders' Society,** annual meeting, Homestead Hotel, Hot Springs, Va.

**June 27-28—American Foundrymen's Society,** chapter chairmen's conference, Chicago

**June 27-July 1—American Society for Testing Materials,** annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

**July 28-29—American Foundrymen's Society,** annual directors meeting, Chicago

**Sept. 12-16—Fourth National Instrument Conference and Exhibit,** sponsored by Instrument Society of America, Municipal Auditorium, St. Louis

**Oct. 7-8—New England Regional Foundry Conference,** sponsored by New England Foundrymen's Association and Massachusetts Institute of Technology, MIT, Cambridge, Mass.

**Oct. 10-14—American Society for Testing Materials,** Pacific Coast meeting, Fairmont Hotel, San Francisco

**Oct. 13-14 — Steel Founders' Society of America,** fall meeting Ambassador Hotel, Los Angeles

**Oct. 13-15—Foundry Equipment Manufacturers Association,** annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

**Oct. 17-21—American Society for Metals,** metal congress and exposition, Public Auditorium, Cleveland

**Oct. 27-28—Gray Iron Founders' Society,** annual meeting, Edgewater Beach Hotel, Chicago

**Nov. 3-5—Mechanite Metal Institute,** annual meeting, Hotel Carter, Cleveland

**Nov. 15-16—Michigan Regional Foundry Conference** sponsored by the Michigan AFS chapters, Michigan State College, East Lansing, Mich. (Tentative)

**Nov. 15-17 — National Foundry Association,** annual meeting, Waldorf-Astoria Hotel, New York

**Nov. 25-26—New York Regional Conference,** sponsored by New York AFS chapters, Syracuse University, Syracuse, N. Y.

**1950**

(Tentative Schedule)

**Feb. 8-9 — Steel Founders' Society of America,** annual meeting, Edgewater Beach Hotel, Chicago

**Oct. 12-13—Foundry Equipment Manufacturers' Association,** annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

**Oct. 19-20—Gray Iron Founders' Society,** annual meeting, Netherland Plaza Hotel, Cincinnati

**Nov. 8-10—National Foundry Association,** annual meeting, Edgewater Beach Hotel, Chicago

## OBITUARY

**F. E. RUNDQUIST,** 63, foundry manager, Greenlee Bros. & Co., Rockford, Ill., died Mar. 2, in Phoenix, Ariz., where he had gone to recuperate from a heart attack. Mr. Rundquist, a native of Rockford, joined Greenlee Brothers in 1910. An active member of the Northern Illinois Foundrymen's Association, he was chairman of the committee which was responsible for its admission to the American Foundrymen's Society in 1938 as the Northern Illinois-Southern Wisconsin Chapter of that organization.

* * *

**George Clapp,** 90, a director and one of the founders of Aluminum Co. of America, Pittsburgh, died Mar. 31, in Sewickley Valley Hospital. A native of Pittsburgh, Mr. Clapp was graduated from Western University, now University of Pittsburgh, at the age of 16. Following graduation he worked in the machine shop of Penn Cotton Mill and the Black Diamond Steel Works, and later helped form the Pittsburgh Reduction Co. which grew into Aluminum Co. of America. He became treasurer, secretary and vice president of the company and was one of its directors at the time of his death.

* * *

**Gilbert U. Fouts,** 58, for 35 years foreman in the patternmaking department of the Federal Foundry Co., Division of American Stove Co., Indianapolis, died there Mar. 17. A native of Bourbon, Ind., Mr. Fouts had been associated with the American Stove Co., St. Louis, for 43 years and previously worked at the company's plant in Bedford, O.

* * *

**Dr. Willard H. Dow,** 52, president, the Dow Chemical Co., Midland, Mich., was killed in a plane crash, Mar. 31, near London, Ont. Dr. Dow, a graduate of University of Michigan, succeeded to the presidency of the company at the death of his father, Dr. Herbert H. Dow, in 1930.

* * *

**Robert W. Daykin,** 55, assistant manager, Thew Shovel Co., Elyria, O., died Mar. 15, at Elyria Memorial Hospital. Mr. Daykin, a native of Cleveland, was graduated from Case Institute of Technology in 1915. He became associated with Thew Shovel Co. 27 years ago.

* * *

**Edwin J. Lame,** 77, vice chairman of the board of directors, R. D. Wood, Philadelphia, and the Florence Pipe Foundry & Machine Co., Florence, N. J., died Mar. 26, at his home in Wynnewood, Pa.

# Bathing Before Burning . . the Bodies for the *Purification*

of the souls of the deceased. This is the custom of the natives in the region of the Sacred River of Jumma.

No. 4 of a SERIES

## METAL *Purification*

## is of Prime importance in the FOUNDRY TODAY and the use of PURO-SEAL CST-1 FLUX is a KEY FACTOR in the Production of QUALITY BRASS and BRONZE CASTINGS

Progressive foundries who are putting strong emphasis on consistent highest quality brass and bronze casting output are relying upon scientifically balanced PURO-SEAL CST-1 FLUX to assure better castings regardless of the volume and nature of impurities present in the metal before melting.

The exceptional results obtained are attributed to the ability of PURO-SEAL CST-1 FLUX to promote and accelerate the elimination of pores and reduce zinc fumes and scrap losses due to oxide inclusions and dross.

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FOR THE PURIFICATION OF METALS

**THE PURO-SEAL COMPANY**

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# INDUSTRY Briefs

INTERNATIONAL HARVESTER CO., 180 North Michigan Ave., Chicago 1, has appropriated $3,500,000 for a rehabilitation and modernization program at its Canton Works, Canton, Ill. The program includes additional manufacturing facilities, replacement of old equipment and machinery and a number of improvements for the betterment of working conditions. Included in the first part of the program, which is to be spread over 12 to 15 months, is construction of a new pattern storage building of 11,000 sq ft and a new 56,000 sq ft manufacturing building. Several new wash, locker and toilet rooms will be built and the present foundry building will be reconditioned to improve ventilation.

* * *

Charter Oak Stove & Range Co., St. Louis, Mo., subsidiary of Reynolds Metals Co., Richmond, Va., has been closed. One of the oldest stove manufacturers, the company was organized in 1847 as the Excelsior Mfg. Co. and was incorporated under its present name 46 years ago. Reynolds may use the plant for other metalworking operations.

* * *

American Brake Shoe Co. is expanding its sales activities in Cleveland with the addition of the National Bearing Division in its sales offices at 915 Midland building. L. E. Hoyer and J. Robert Lottes, formerly with National Bearing's Meadville, Pa., plant, have been transferred to the Cleveland office. Their activities will be under the direction of James J. Nelson, eastern sales manager for the company.

* * *

Superior Electrocast Foundry Co., a newly formed steel foundry, has started operations in San Francisco. Heading the company is Charles Hoehn Jr., formerly manager, Foundry Division, Enterprise Engine & Foundry Co., San Francisco. Melting equipment consists of a 3000-pound capacity electric furnace, and casting capacity is about 120 tons a month.

* * *

McShane Bell Foundry Co., manufacturer of bells for churches, ships, etc., has moved into a former foundry building, containing approximately 6000 sq ft, at 201 East Federal St., Baltimore. Some months ago the company's plant at Harford Rd. and the Baltimore & Ohio Railroad was demolished by fire. William R. Parker is president.

* * *

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill., has appointed Minnesota Supply Co., 706 Portland Ave., Minneapolis 15, as agent for the varied line of Whiting foundry equipment. That company succeeds the E. R. Frost Co. of Minneapolis as Whiting equipment sales agent in that area. Other distributors who will handle the company's Trambeam systems are: Patton Equipment Co., 3020 Olive St., St. Louis and 1733 Main St., Kansas City 2, Mo.; Dearborn Fabricating & Engineering Co., 13105 Prospect Ave., Dearborn, Mich.; Central Rubber & Supply Co., 30 East Georgia St., Indianapolis 9; Western Machinery Corp., 1035 Southeast Ninth Ave., Portland, Oreg., and Metal Laundry Inc., 1005 East Union St., Seattle 22.

* * *

Tennessee Products & Chemical Corp., American National Bank Bldg., Nashville, Tenn., has resumed production of pig iron at its Rockwood, Tenn., plant, following completion of a $250,000 improvement and re-equipment program. The two Rockwood furnaces had been producing ferromanganese since 1941. Anticipated production is 9000 to 10,000 tons of pig iron monthly.

* * *

Steel City Testing Machines Inc., 8843 Livernois Ave., Detroit, has appointed J. W. Dice & Co., Grand View-on-Hudson, N. Y., as exclusive sales representative in the Middle Atlantic area. Steel City Tool & Machinery Co., Pittsburgh, will cover the Pittsburgh area including western Pennsylvania, West Virginia and adjacent counties in Ohio.

* * *

Lebanon Steel Foundry, Lebanon, Pa., has completed a $500,000 plant addition for production of super-alloy castings under processes developed by Firth-Vickers Stainless Steels Ltd., Sheffield, England, for which the Lebanon company is American licensee. New equipment is designed to cover all phases of varied centrifugal casting requirements.

* * *

Minneapolis-Honeywell Regulator Co., 2709 Fourth Ave., Minneapolis, has acquired H. Belfield Co., Philadelphia which will be known as the Belfield Valve Division of Minneapolis-Honeywell. Howard L. Murray, president of Belfield, is in charge of the new division as a vice president of Minneapolis-Honeywell.

* * *

Economy Pattern & Foundry, 315 West Avenue, Los Angeles 33, has been incorporated with $50,000 capital. Officers include: Bert A. Keeley, president; John T. Reed, vice president; Vincent B. Morales, secretary; Charles W. Pike, treasurer, and Bert E. Keeley, general manager.

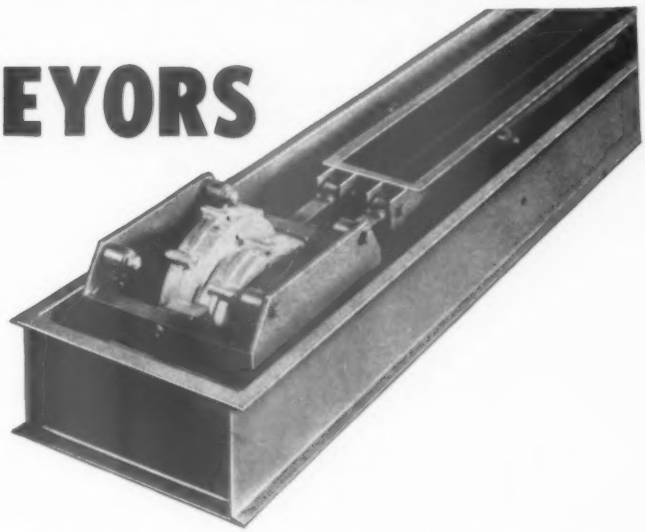
* * *

Syntron Co., 1940 Black St., Homer City, Pa., manufacturer of vibratory material handling and construction

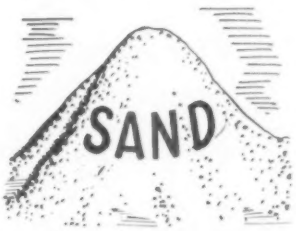
(*Concluded on page* 246)

**NEW FOUNDRY:** American Foundry Co.'s new $15 million plant at West Morris St. and Tibbs Ave., Indianapolis, is scheduled to produce 500 tons of castings daily, double the company's present plant capacity. The plant will supply engine blocks for Chrysler Corp. *Indianapolis News* photo

# Questions and Answers about AJAX LO-VEYORS



**WHAT MATERIALS CAN BE HANDLED?**

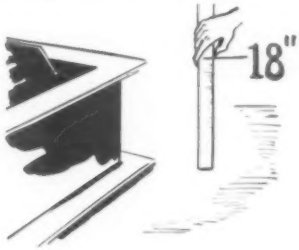



Dry aggregate materials ranging from granular up to 6" lumps such as sand and castings.

**IS DUST-TIGHT OPERATION AVAILABLE?**

Flat conveyor pans with cover and booted inlets and outlets and also gastight tubular conveyors permit handling materials without contamination or explosion

**HOW MUCH HEAD ROOM IS REQUIRED?**

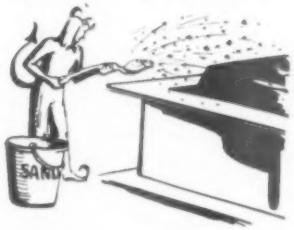



Average overall height is less than 18" except for a short distance where shaker is mounted.

**HOW DO AJAX LO-VEYORS REDUCE COSTS?**

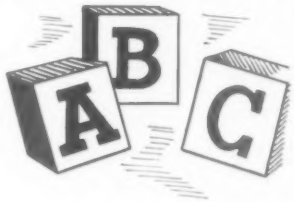
They eliminate moving materials by costly non-productive shovel and wheelbarrow methods.

**ARE ABRASIVE CONDITIONS HARMFUL?**



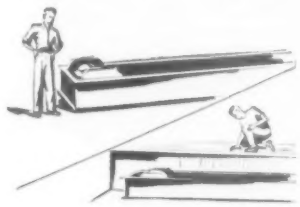

Unaffected by sand and abrasives, they are ideal for foundries, chemical plants, cement mills, etc.

**HOW DOES AJAX REDUCE WEAR?**



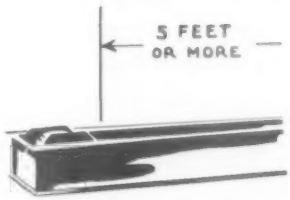

Reciprocating drive unit is completely enclosed. All eccentrics, idler pulleys and exposed bearings are eliminated.

**CAN AJAX LO-VEYORS BE INSTALLED ANYWHERE?**



They are self-contained units ready to set in place and use. Easily installed on or below floor or suspended from wall or ceiling.

**CAN THEY BE USED FOR SHORT AND LONG CARRIES?**




Lengths, widths and capacities to suit various materials, plant conditions and requirements of the process.

**ARE AJAX LO-VEYORS ECONOMICAL?**

They are economical to buy, operate and maintain.

•

*Write telling us your material handling needs and Ajax engineers will make recommendations.*

**AJAX FLEXIBLE COUPLING CO. INC. WESTFIELD, N. Y.**

P.A.
BOSS
FOREMAN
We all agree on
"CERTIFIED"
"I like 'Certified' Abrasives. They're extra tough, keep our blast-cleaning operations at top-efficiency. Clean better, produce a better product, and that means more sales."
" 'Certified' abrasives suit me to a 'T'. I always specify 'Certified' because they keep blast cleaning costs at rock bottom. Actually cost less because they can be used over and over and over."
"Blast cleaning's easier with 'Certified.' Since using Samson Shot and Angular Grit my crew turns out more work every day—and it's better work, too. Keeps costs down and makes my bosses happy!"
. . . Always Specify "CERTIFIED"
100 LBS.
BOSTON, MASS.
USE NO HOOKS
100 LBS.
ANGULAR
GRIT
MFG. U.S. PAT. OFF.
MANUFACTURED BY
PITTSBURGH CRUSHED STEEL CO.
PITTSBURGH, PA. U.S.A.
USE NO HOOKS
PITTSBURGH
CRUSHED STEEL CO.
PITTSBURGH, PENNA.
STEEL SHOT
AND GRIT CO.
BOSTON, MASS.


(*Concluded from page* 244)

and maintenance equipment, has moved its Philadelphia branch sales office to larger, more centrally located quarters at 1018-20 West Lehigh Ave. The Kansas City, Mo. office has been moved to the Wirthman Bldg., 31st St. at Troost Ave.

* * *

Hansen-Lynn Co., 800 Flower St. Burbank, Calif., has been incorporated with $300,000 capital, to engage in foundry work, toolmaking, machining, mechanical and electrical engineering. Members of the company include Elwood E. Hansen and J. G. Hansen, of Carpinteria, Calif., and Malcolm R. Maben, Los Angeles.

* * *

War Assets Administration has sold to Albion Malleable Iron Co., Albion, Mich., a surplus, government-owned plant there, for $350,000. The company will continue to operate the plant in production of malleable iron castings. During the war it produced malleable iron castings there for the Army's heavy truck program.

* * *

Total tonnage of acid open-hearth steel melted during 1948 for both castings and ingots was 1,267,177 tons, according to the Acid Open Hearth Research Association, Pittsburgh. Of this total, 49.15 per cent was for ingots and 50.85 per cent was for castings. Tonnage for 1947 was 1,257,673.

* * *

L. W. & W. K. Mitchell, general foundry supplies, formerly located at 3820 North Capitol Ave., Indianapolis, has moved to a new office and warehouse at 38 South Shelby St. Increased warehouse space and a more central location have been provided by the change in location.

* * *

Mine Safety Appliances Co., Braddock, Thomas & Meade Sts., Pittsburgh, plans construction of the John T. Ryan Memorial Laboratory, named for one of its founders, which will be made available to industry for investigation of safety equipment problems.

* * *

Precision Matchplate Co., 102 School St., Cambridge, Mass., organized in February, is engaged in the manufacture of plastic matchplates, coreboxes, and loose patterns. Edward T. Sullivan is president.

* * *

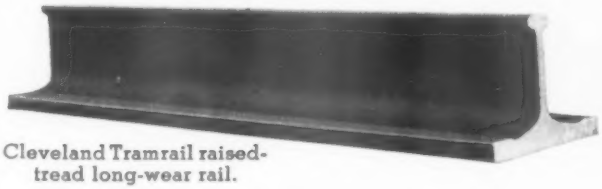
Combined volume of shipments of ingot brass and bronze, as reported by the Ingot Brass & Bronze Industry, Chicago, was 15,026 tons for February, 1949, compared with 19,456 tons in January and 22,487 tons in February, 1948.

# MATERIALS HANDLING IN THE FOUNDRY INDUSTRY

Many hundreds of foundries—grey iron—steel — malleable — brass — bronze — aluminum — magnesium — are enjoying numerous advantages possible with Cleveland Tramrail. They are speeding production and lowering costs by eliminating rehandling and providing straight-line production efficiency. They are reducing floor congestion, removing hindrances and confusion and promoting safety. In many instances, they are eliminating need of plant expansion by installing Cleveland Tramrail.

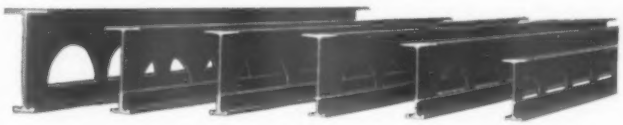
Pouring two 1000-lb. ladles simultaneously in the production of 200-lb. malleable castings. Each ladle is handled on an individual Cleveland Tramrail transfer bridge.

## STANDARD ITEMS EASILY COMBINED TO HANDLE MATERIALS OF ANY KIND



Cleveland Tramrail raised-tread long-wear rail.

Cleveland Tramrail consists of standard items such as rail, switches, carriers, cranes, hoists, grabs, etc., which can be combined in a thousand-fold ways to serve nearly every materials handling requirement.



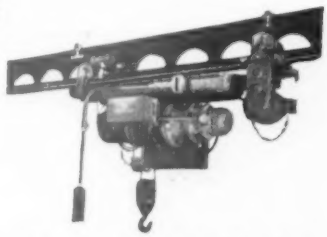
Cleveland Tramrail Archbeam in seven sizes for various loads and conditions.

Nine 60-ton gondola cars of sand are unloaded, on an average, every 24-hour working day in a steel foundry, with two Cleveland Tramrail cranes and $\frac{1}{2}$ yard grab buckets.

## 30,000 INSTALLATIONS

Hand propelled carrier built for long life and easy operation. Wheels have hardened tread and flange; bearings are double race type.

Backed by experience with 30,000 installations in industries of all types, Cleveland Tramrail representatives are in exceptionally good position to serve you. They will gladly advise, survey your plant, make layout or prepare quotation without obligation.



Motor-driven carrier with electric hoist. One of many types built by Cleveland Tramrail.

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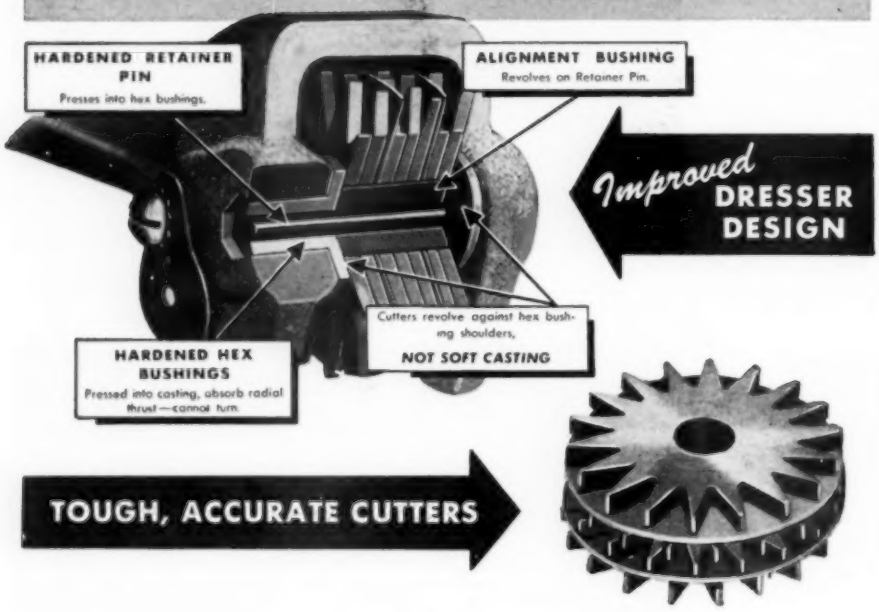
**CLEVELAND TRAMRAIL**
**OVERHEAD MATERIALS HANDLING EQUIPMENT**

# THE *Right* COMBINATION FOR ECONOMICAL GRINDING WHEEL DRESSINGS


HARDENED RETAINER PIN
Presses into hex bushings.
ALIGNMENT BUSHING
Revolves on Retainer Pin.
Improved DRESSER DESIGN
Cutters revolve against hex bushing shoulders, NOT SOFT CASTING
HARDENED HEX BUSHINGS
Pressed into casting, absorb radial thrust—cannot turn.
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If your local mill supply house or agent does not carry the complete line of Vincent Dressers and Cutters, write today for complete information and prices. Immediate delivery.

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*Heat Treaters of Metals—300 Tons Capacity Daily*
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**2424 Bellevue Avenue** **Detroit 7, Michigan**


## FINISHING CONTROL

(*Continued from page* 123)

a few minor changes—for the latter to produce as much as the foundry.

We then proceeded to study this department, starting with the first operation—the cleaning section. An investigation of about two weeks in this section disclosed that we would not need the two new blast units that everyone seemed to believe were required. The major problem found was lack of maintenance on the existing machines and the lift trucks used in the section. After the proper maintenance had been obtained, and correct control of the iron being annealed was established, it became possible for the cleaning department to be cut down to two 8-hour shifts five days a week, instead of two 11-hour shifts six days a week.

### Efficiency Was Low

From that point we moved to the presses, which in our plant perform the final operation for the finishing department. After spending three weeks analyzing every operation required of the presses, it was found that their efficiency was only 49 per cent. Contributing to this situation were the following:

1. Dies were being changed on an average of one per press every hour.
2. Men were waiting for skid boxes in which to put the iron.
3. Presses were being stopped because the dies were not properly maintained.

With the above three factors in mind, it was figured that efficiency of the presses could be increased at least 40 per cent by enlarging the storage capacity after cleaning, which would give longer runs on the presses and also give additional cleaning storage capacity. In addition, storage capacity before pressing was increased so that there would be further assurance of sufficient storage for the shears and grinders. The dies were improved so that they would remove gates, fins, etc. Also the inspection operation was moved up to the presses so that all operations would be completed after the pressing. After the foregoing changes were made, our pressing operation was cut from a three 8-hour shift six days a week, to two 8-hour shifts five days a week.

These changes left still another bottleneck, one which had never existed before. Our main trouble had always been lack of enough cleaned and pressed iron; now we discovered we were unable to grind or shear enough iron. So again we made a

study, first of our shearing section where it was found the shears were not being used to full capacity. By changing the gating on some jobs and making faster shearing fixtures, we were able to shear some jobs rather than grind them, which in turn improved both operations accordingly. However, trouble still existed in the grinding section, especially in hand grinding operations. Here, after an extensive study, it was found that by tightening up on the foundry for fins, unnecessary check straps and plain poor molding, and by doing some grinding in the trimming department, we were able to cut our grinding section from three shifts, two of which had 26 men each and a third shift 7 men, to two 8-hour shifts of 16 men each.

With these few minor changes, it seemed that the finishing department was under complete control, but one thing had been forgotten. That was the shipping of the iron after the final inspection. In improving operations in the finishing department we had been increasing the manpower required to handle and ship the iron produced. To cite a good example, we were producing castings which, after being inspected, were stored in a pile on the floor. When it was time for these castings to be shipped, they had to be picked off the floor, put in four-wheel carts, pushed over a scale for weighing and then pushed onto loading docks where they were rehandled in being unloaded into the waiting trucks. We were handling every 25 groups of castings this way and the method took forever and a day to load a truck.

### Eliminate Handling Operations

The procedure that improved this operation was to buy a few hoppers, inspect the castings directly into the hoppers, and use the lift trucks that we had in the finishing department to move the castings over the scales and directly into the trucks. Another change made was to ship castings to our customers loose in skid boxes to eliminate the handling of bags. With the foregoing few changes we were able to handle all the iron produced by the presses.

These improved methods in the finishing department may seem quite obvious but we are striving constantly to better our operations further. The things that we try to control so that finishing operations are held to a minimum are as follows:

1. Scheduling of jobs by the production planning department so that they come to the finishing department in one group.

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**CHAIN CORPORATION**
*(Affiliated with Chisholm-Moore Hoist Corporation)*
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2. Advice by the foundry to the finishing department of any changes in gating, check straps, etc.

3. Maintenance of soft iron scrap in the finishing department to 2 to 2½ per cent.

4. Packing of castings by the annealing department so that warpage, scaled iron and under-annealed iron are held within certain tolerances.

With the foregoing controls and the improvements in the operation of the finishing department, we have been able to out-produce the foundry tonnage-wise. This should suggest that any foundry considering departmental improvements will find it advisable first to make a thorough study of the operations involved. In doing so it may discover, as we did, that it has the necessary equipment but is not using it to maximum efficiency.

## SEVEN FOUNDRYMEN RECEIVE AWARDS

(*Concluded from page* 97)

of the AFS exchange paper, "Do You Use Your Cost System?" which was presented at the annual meeting of the Institute of British Foundrymen. After studying both law and accounting, Mr. Lee became associated with the foundry industry in 1917, becoming secretary-treasurer of the Liberty Foundry Co., Milwaukee, in 1920, and serving in that position for 20 years. In 1940 the company merged with Grede Foundries Inc., and he was comptroller prior to becoming secretary-treasurer, his present position.

**William B. Wallis,** who will receive an honorary life membership in recognition of his untiring service as president of AFS this year, was graduated from Pennsylvania State College in 1911. Prior to becoming associated in 1920 with the Pittsburgh Lectromelt Furnace Corp., Pittsburgh, of which he is president, Mr. Wallis was engaged in the consulting field with W. E. Moore & Co., Pittsburgh. In addition to being active on a number of the society's committees, Mr. Wallis also served three years on the AFS board of directors.

## Proceedings

Proceedings of the twelfth annual conference of Executives of State and Local Trade Associations held Sept. 14-15 at Granville, O., have been incorporated in booklet C-56 of the College of Commerce conference series, Ohio State University, Columbus, O. It is now available from the college.

# We don't know all the answers about Sand Core Bonding

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Our representatives are thoroughly familiar with the properties and production advantages of BAKELITE Resins. That is why, working with foundrymen, they have been able to show that . . .

BAKELITE *Phenolic* Powder and Liquid Resins are particularly serviceable as sand core binders for ferrous castings. They can be baked at the normally high temperatures required for the non-resin binders.

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Ask your present supplier for further information on core binders made with BAKELITE Resins. Or, if he is not equipped to do so, we will gladly send you samples and instructions, or arrange to have a sales engineer visit your plant. Simply fill out the coupon and mail.

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# STRESS ANALYSIS FOR THE STEEL FOUNDRY

(*Continued from page* 107)

used for all tests. These particular castings were low carbon steel unannealed. The analysis of the rolled plate disks was: C-0.238 per cent, Mn-0.46 per cent, Si-0.047 per cent, P-0.010 per cent, and S-0.026 per cent. Fig. 3 shows the area to weld in each test, and the following procedures were employed.

*Welding sequence A*

(a) Tacking at three points—120° apart at the root.

(b) Three passes completed one layer of weld metal, backstepping and reversing direction each layer.

(c) Fourth and last layer was one continuous pass.

*Welding sequence B*

(a) Tacking at three points—120° apart at the root.

(b) Third tack was lengthened and brought up to the top of groove in one pass (weld area No. 1 so formed, sloped off on both sides down to the root).

(c) Diametrically opposite from this weld, passes 2, 3, 4, 5, (all of equal length) were laid in, for about 120° arc around the disk.

(d) Passes 6, 7, 8, 9, 10 were laid joining weld area No. 1 to 2, 3, 4, 5.

(e) Passes 11, 12, 13, 14, 15, 16 were laid filling the rest.

*Welding sequence C*

(a) Two tacks—180° at the root.

(b) Steel "retainer" bar welded to casting—overhanging the weld groove and the edge of the disk.

(c) Diametrically opposite this retainer bar, passes 1, 2, 3, 4, 5 were laid in for a 90° arc around disk.

(d) Passes 6, 7, 8, 9, 10 filled up another quarter at one end of the 1, 2, 3, 4, 5 weld area.

(e) Passes 11, 12, 13, 14, 15, filled up a quarter at the other end of 1, 2, 3, 4, 5 weld.

(f) The retainer bar was burned off and the last quarter was laid in with passes 16, 17, 18, 19, 20.

*Welding sequence D*

(a) Two tacks—180° at the root.

(b) Pass No. 1 was brought up from the root to the top of the plate, leaving a gradual slope on each side, finishing with a very short final bead at the top.

(c) Passes 2, 3, 4, 5, 6, 7, 8, 9, 10 were laid in on these sloping sides of Weld No. 1, alternately left and right.

(d) Passes 12, 13, 14 were flat welds to close in the rest of the groove (pass 12 at the root, 13 the middle, and 14 the final bead).

*Welding sequence E*

(a) Three tacks—120° at the root.

(b) Very thin passes used, backstepping, with four passes (90° arc each) to the layer.

(c) Nine such layers up to the top of weld groove.

*Welding sequence F*

(a) Three tacks—120° at the root.

(b) Pass No. 1 at root, clockwise continuous.

(c) Passes 2, 3, 4, 5, 6, 7, 8 clockwise continuous to top.

In each of the six sequences, welding was done one day and strain tests made the following day—"drift" of the AR-1 gages was practically negligible in each case. All strain measurements and welding data have been compiled in Table IV.

**Summary**—In sequence *D* one of the tacks cracked through while welding—probably this allowed a relief of some stress; this test had the lowest residual stress.

The principal stresses were all tension stresses originally; their calculated values for each sequence are given in Table III.

Here we have a very dependable method for the determination of residual stresses (destructive) as well as a method for determination of actual stress values from proof load tests (nondestructive).

### Appendix

Dyadic Circle method for calculation of principal stresses from strain gage readings on rosettes:

(1) Choose some gage line (preferably horizontal) in the rosette as a basic line (*a*) from which all angles will be measured.

(2) Letter each gage line *a*, *b*, *c*, around the rosette counter clockwise and indicate deformation on each ($e_a$, $e_b$, $e_c$).

(3) Choose a reference point (O), and draw line through it parallel to basic gage line (*a*). Direction to right of reference point designate as positive, and to left as negative.

(4) Lay off to some scale on this reference line, deformation $e_a$ in a direction opposite to the sign of the deformation to locate *A*.

(5) Through point *A* draw a line perpendicular to reference line. This is tangent line $T_A$. The side of $T_A$ on which the reference point lies, carries the same sign as the deformation plotted.

(6) Take gage line (*b*), draw line through the reference point *O* making an angle with the reference line equal to twice the angle between the basic line (*a*) and gage line (*b*).

(7) Layoff to the same scale, a distance equal to $e_b$ in the direction from the reference point *O* opposite to that indicated by the sign of the deformation to locate point *B*.

(8) Through point *B* draw a tangent line $T_B$ perpendicular to the line joining *B* and the reference point *O*. The side of the line nearest the reference point carries the same sign as the deformation plotted.

(9) Repeat 6, 7, 8, for gage line *c*.

(10) Next draw your dyadic circle so that it is tangent to $T_A$, $T_B$, $T_C$ and lies wholly on the positive or

(*Concluded on page* 254)

**TABLE I—Approximate Residual Stress**

| Plate Thickness, In. | Residual Tensile Stress, Psi |
|---|---|
| 0.39 | 1300 |
| 1.18 | 2100 |
| 2.36 | 3100 |

**TABLE II—Disk Without Stress Relief**

| Gage | Range Ext. | Reference Point $R_1$ | $D_1$ | $R_2$ | $D_2$ | Strain in Microinches |
|---|---|---|---|---|---|---|
| 0° | 0 | 5 | 050 | 4 | 830 | —220 |
| 45° | 0 | 2 | 872 | 2 | 465 | —407 |
| 90° | 0 | 5 | 085 | 4 | 905 | —180 |

**TABLE III—Calculated Values**

| Sequence | Maximum, psi | Minimum, psi |
|---|---|---|
| A | 32,540 | 27,720 |
| B | 29,485 | 22,200 |
| C | 29,160 | 24,420 |
| D | 27,490 | 23,560 |
| E | 31,150 | 27,960 |
| F | 28,050 | 25,140 |

**TABLE IV—Data from Sequence in Arc Welding with Restraint**

| Sequence | Welding Rod | Current, Amp | Strain Gage | Range | Reference Point $R_1$ | $D_1$ | $R_2$ | $D_2$ | Strain in Microinches |
|---|---|---|---|---|---|---|---|---|---|
| A | 1/4-in. Wilson 98N | 400 | 1 | 0 | 4 | 420 | 3 | 818 | —602 |
| | | | 2 | 0 | 2 | 810 | 2 | 130 | —680 |
| | | | 3 | 0 | 3 | 540 | 2 | 765 | —775 |
| B | 1/4-in. Wilson 106 | 400 | 1 | 0 | 3 | 410 | 2 | 728 | —682 |
| | | | 2 | 0 | 1 | 538 | 0 | 815 | —723 |
| | | | 3 | 0 | 3 | 775 | 3 | 245 | —530 |
| C | 1/4-in. Wilson 106 | 400 | 1 | 0 | 3 | 640 | 2 | 910 | —730 |
| | | | 2 | 0 | 3 | 550 | 2 | 960 | —590 |
| | | | 3 | 0 | 3 | 700 | 3 | 158 | —542 |
| D | 1/4-in. Sureweld "B" | 300 | 1 | 0 | 6 | 070 | 5 | 455 | —615 |
| | | | 2 | 0 | 4 | 015 | 3 | 335 | —680 |
| | | | 3 | 0 | 2 | 685 | 2 | 105 | —580 |
| E | 1/4-in. Wilson 98N | 300 | 1 | 0 | 3 | 130 | 2 | 510 | —620 |
| | | | 2 | 0 | 4 | 020 | 3 | 300 | —720 |
| | | | 3 | 0 | 3 | 315 | 2 | 558 | —757 |
| F | 1/4-in. P&H AP | 300 | 1 | 0 | 3 | 162 | 2 | 578 | —584 |
| | 5/16-in. Wilson 98N | 500 | 2 | 0 | 4 | 190 | 3 | 518 | —672 |
| | Wilson 98N | 400 | 3 | 0 | 5 | 508 | 4 | 852 | —656 |

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(*Concluded from page 252*)

wholly on the negative side of these lines; If wholly on the negative side, the sign of the circle is negative; if wholly on positive side, the sign of the circle is positive.

(11) Draw a diameter *PQ* of the dyadic circle parallel to reference line. Draw a line *OSR* from reference point through center of dyadic circle cutting the circle at both sides, giving the principal deformations *OS* and *OR*. If the line *OS* lies wholly without the circle, the sign of *OS* shall be that of the outside of the circle. If any part of the line lies within the circle, the sign will be that of the interior of the circle. *PR* shows the direction of the principal deformation *OR* and *PS* shows the direction of the principal deformation *OS*.

The following formulas can be used to calculate the magnitude of the principal stresses from the deformations *OS* and *OR*

$$S_{OR} = \frac{E}{1-\mu^2}(e_{OR} + \mu e_{OS})$$

$$S_{OS} = \frac{E}{1-\mu^2}(e_{OS} + \mu e_{OR})$$

where $\mu$ = Poisson's ratio for steel and $E$ = modulus of elasticity for steel.


**References**

1. *Supplement to Journal*, American Welding Society, W. Sparagen, and W. E. Claussen, pp. 2-62, November 1937.
2. "Residual Stress Measurements — SR-4 Gages" *SR-4 Newsletter*, Vol. II, No. IV, Baldwin - Southwark, Baldwin Locomotive Works.
3. "Dyadic Circle For Interpreting Strain Gage Readings," R. G. Sturm, July, 1930, Society For Experimental Stress Analysis.

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## Malleable Founders Expand Research

Malleable Founders' Society is inaugurating an expanded and continuing research program. The activity will include a study of methods looking toward further improvement and development of manufacturing methods and expanded markets. It will also include a special study in the field of nodular graphite iron to determine the most effective way in which the industry's facilities and know-how may be employed in the production of this new type iron.

The society's Research Committee chairman, C. A. Gutenkunst Jr., Milwaukee Malleable & Grey Iron Works, Milwaukee, has completed arrangements for conducting the work at the Southern Research Institute, Birmingham. L. J. Wise, Chicago Malleable Castings Co., C. F. Lauenstein, Link-Belt Co., Indianapolis and W. A. Kennedy, the Grinnell Corp. Providence, R. I., comprise the metallurgical advisory group which, with James H. Lansing, technical and research director of the society, will co-operate in guiding the program.

"For present day uses of malleable iron castings, standard malleable iron will continue to provide an economical and tough material which may be easily machined at high production speeds," according to the society's president, C. L. Carter, Albion Malleable Iron Co., Albion, Mich. "There have been to date many confusing and inaccurate statements made concerning the commercial value of nodular graphite iron. This type of iron has been produced only experimentally in both England and the United States by adding small amounts of cerium, magnesium, or other elements.

"By utilizing its facilities and long experience in closely controlled production of malleable iron castings, the malleable industry through its research program is placing itself in the position to intelligently supplement its standard malleable production with the production for malleableized nodular graphite iron castings, when and if this type of casting is proved to be economically and commercially feasible."

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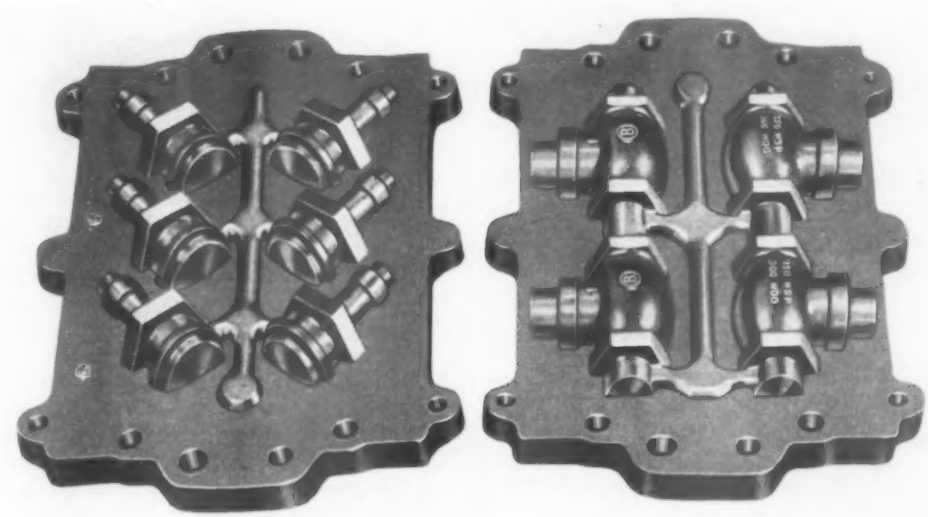
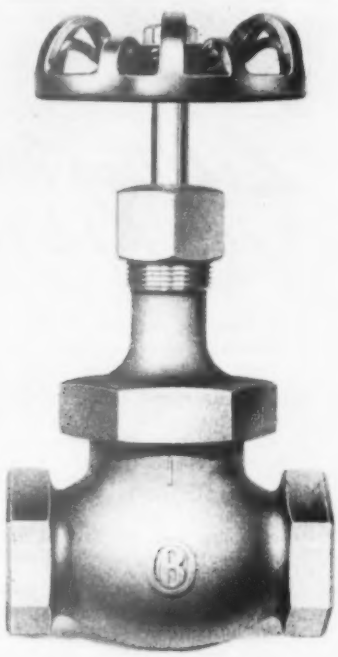
*A globe valve is a means of control. In order to maintain this control, valve castings in themselves must be controlled. They must have the strength to withstand high pressures over a long period of time, and can have no weak spots or flaws.*





These copper patterns mounted on Berkshire molding plates, produce dependable brass castings for this valve. **THE OHIO BRASS COMPANY OF MANSFIELD, O.,** selected Master Pattern Company patterns to help them maintain the high standard of their valves. They know that controlled pattern accuracy pays.

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DESIGNERS AND MANUFACTURERS OF PERMANENT MOLDS, WOOD AND METAL PATTERNS AND MODELS

## ESTABLISHING THE BREAK-EVEN POINT

(*Continued from page* 119)

still further, we find that it bisects the line representing the variable costs (metal plus variable conversion costs) at 2,200,000 pounds of production. This represents the out-of-pocket line, or the number of pounds that could be produced without the loss that would be incurred because the company accepted orders at the going price of nine cents per pound.

Of course, the wise foundryman will establish the out-of-pocket line and cease bidding at that point. On the other hand, he may decide to eliminate certain fixed expenses, even reductions in sizable salaries, so that the out-of-pocket line may be reduced to a lower tonnage, which in turn will allow a lower price. The lower price may assist in keeping the organization together pending return of more normal times. As the market price level changes, either up or down, the foundry management should be alert to the need of revising the chart. By so doing the maximum advantages of cost control and sales policies may be had.

Thus far we have considered the so-called production foundries. Now we will discuss the more difficult problems in arriving at the break-even point and the out-of-pocket line in jobbing foundries.

Since the jobbing foundry produces castings of many shapes and sizes, it is necessary to consider each separate operation necessary to convert the raw metal into finished castings. Certain cost principles must be adhered to in any procedure for cost determination, for deviation from those principles may lead to some very erroneous and unreliable results. The true measurement of each operation depends on:

1. The cost to operate a production facility per hour, per month, per year, or any other period that may be selected.

2. The quantity produced.

3. The hours, or fractions thereof, required for processing.

The author has discovered numerous instances in which accountants, engineers and foundry managements authorized the use of averages when determining costs of individual jobs, without any recognition of the foregoing principle. Let us repeat, *you can not average unrelated things and secure a very sensible result.*

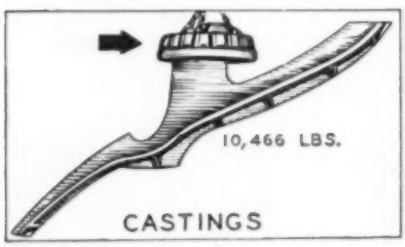
Several charts are presented here to illustrate the effects of using averages instead of measured costs of the following basic foundry operations: Melting, coremaking, molding, tumbling, chipping and grinding, machining.

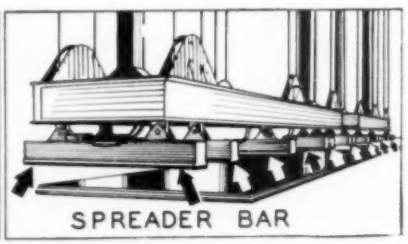
**Melting Cost** — Assume that a foundry is equipped to melt 4,000,000 pounds of a certain grade of iron in a specified normal period, and the total cost of melting is $11,120, made up of $6480 of variable expenses (labor and overhead) and $4640 of fixed expenses.

Furthermore, the types of castings made from this iron vary to the extent that there is a spread from 20 to 80 per cent of good castings produced from the poundage melted. This is designated as per cent yield in good castings, and the average yield is 55 per cent.

A study of the curves in Fig. 1 must indicate the fallacy of using on every job the 50 cents per 100 pounds of good castings produced. Of course, it is easier to figure the melting cost of a specific job when the average is used, and it would be quite reasonable to do so if there were uniformity in the yield of all jobs, but

(*Continued on page* 258)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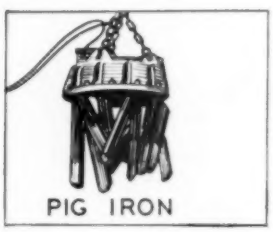


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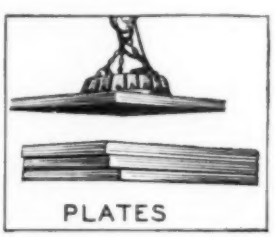


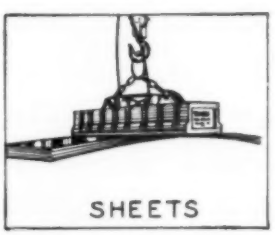


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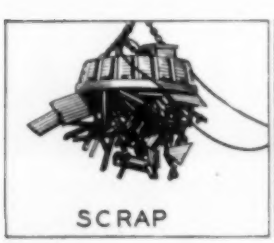


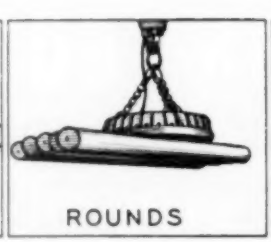


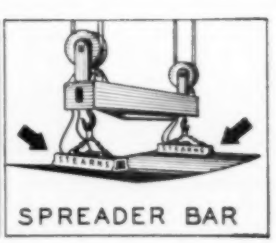

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(*Continued from page* 256)
such a condition does not prevail in the ordinary jobbing foundry. In fact, it would be better to guess at the yield of some jobs than to use the average.

**Core-making Cost**—For years the author has endeavored to find some method of determining the cost of cores for individual jobs that does not entail excessive clerical effort. Thus far there appears to be no substitute for applying costs to individual kinds and sizes of cores on any other basis than the following: Material on the basis of the weight of the core material used; direct labor applied to the job; variable overhead per hour of direct labor; fixed overhead per hour of direct labor.

The fact that some castings require more than one kind of a core makes it necessary to determine the cost of each kind of core. Some castings require the use of both dry and green sand cores; this further emphasizes the necessity for the determination of costs for each different kind of core.

There are many jobs in the foundry where actual costs of cores may be practically determined for the entire number of castings made on the specific order. However, it might be necessary to determine the costs of the several cores separately when estimating for the purpose of establishing a sales policy.

Owing to the various ways of making cores in the industry, uniform core costing tables should not be prepared for general use among a group of foundries. Each foundry should prepare his own tables to conform to his own particular practice.

**Molding Cost**—Some foundries operate molding facilities of such a character that a uniform cost per molder hour on each job will be sufficiently accurate for practical use in determining costs, whereas other foundries employ facilities for molding that vary in character and size. For example, in some foundries the molds are conveyed to the iron, while in other foundries the iron is conveyed to the molds. In fact, both methods of pouring are sometimes used in the same foundry.

Fig. 5 shows the differential in costs per hour for the several sizes of molding facilities used in the same foundry. The same differential would exist if wage rates were uniform among the operators and helpers and direct labor was used as the basis for overhead expense distribution.

There has been considerable discussion by manufacturers concerning the practicability of using the so-called machine rates in cost determination. However, this subject has not been widely considered by foundries. It is hoped that this chart will assist in analyzing prevailing conditions in the gray iron foundry industry to determine the practicability of its adoption.

Special attention is directed to the horizontal line on the chart representing the average hourly cost ($5.34). Compare this with the hourly costs of the facilities not closely in line with this average. Are averages really practical?

**Tumbling Costs**—The purpose of Fig. 6 is to show the differentials in tumbling costs per 100 pounds caused by the different shapes and sizes of castings tumbled in the ordinary jobbing foundry. These factors have a decided influence on the number of castings or the corresponding weights that may be tumbled at one time in the same barrel. For example, 200 pounds of some individual castings may fill the barrel to operating capacity, while some other individual castings may so fit in the barrel that

(*Concluded on page* 260)

Careful measurement of molten metal temperatures does it! Close check on every heat eliminates most causes of misruns, shrinkage, cold shuts and pin holes!

Every nonferrous foundry can have this reliable temperature measurement, with Marshall Enclosed-Tip Thermocouples! With Marshall Thermocouples you can check every heat quickly and accurately. You can make sure that every mould is poured at exactly right temperature. This will assure better castings, do away with excessive scrap production, increase casting output. Write for literature. L. H. Marshall Co., 270 W. Lane Ave., Columbus 2, Ohio.

MARSHALL
THERMOCOUPLES

# SOFFEL'S Complete Line of NON-FERROUS FLUXES

# *Will Lower Your Casting Costs*

**Soffel's non-ferrous Fluxes scientifically remove gases, oxides and iron from your casting metals. They accomplish this removal completely and economically, without changing the chemical analysis of your metal, since they are free of sulfur, phosphorous, silicon, aluminum and magnesium. Each Soffel Flux is prepared for use with a specific metal under specific melting conditions — a Soffel Flux for every need.**

## *SOFFEL'S FLUXES FOR ALL NON-FERROUS METALS*

### BB-2 BRASS FLUX

Removes Iron, Sulfur, Phosphorous oxides and gas from brass and bronze. Increases fluidity and tensile strength. It is recommended for use in open flame or crucible furnaces for melting acid bronze, nickel bronze, phosphorous bronze and red brass.

### ALUMINUM BRONZE FLUX

A perfect deoxidizer for reducing aluminum and iron oxide in manganese bronze, aluminum bronze and Ampco metal. Allows the use of 100% scrap and reduces skimming and dross losses by 90% or more.

### HI-LED BRONZE FLUX

Holds lead up to 50% in copper without the use of nickel. Prevents lead sweating or bleeding. Does not contain sulfur.

### NICKEL MONEL FLUX

Removes gas and adds fluidity to nickel, bronze or monel metal and keeps them free from oxides. Makes casting of nickel alloys as easy as casting red brass.

### COPPERTITE FLUX

Removes cuprous and cupric oxides and gas from copper and produces higher conductivity. Suitable for use in crucible or flame furnaces.

### AB-6 BRASS FLUX

Removes gas and oxides and will not harm any type of furnace lining. Metal is more fluid and melting time is reduced by 20% in the electric furnace melting of red brass, bronze, copper, manganese bronze and aluminum bronze.

### KLEEN-ALL BRASS CLEANER

For ladle or furnace use, it absorbs liquid slag. Keep ladles or furnace linings clean. No flashing or obnoxious fumes. Cleans the metal and reduces metal losses in skimmings.

### BRASS ALUMINUM REMOVER

Absorbs aluminum like magic. It will positively remove all traces of aluminum from copper, brass or bronze. The foundrymen's friend.

### FERRO-OUT IRON REMOVER

Removes free iron or alloyed iron from brass, bronze or copper. Economical to use in open-flame or crucible furnaces. Removes iron like magic.

### SOFFELITE ALUMINUM FLUX

Removes aluminum oxide and iron from aluminum and increases the fluidity and tensile strength of the metal. Also improves the machining quality of any aluminum or aluminum alloy.

### SUPER BRASS FLUX

For red brass, yellow brass and bronze. Guaranteed to prevent oxidation and metal loss of zinc, lead and tin especially in rapid furnace melting. Skimming losses of the metal are eliminated.

### BRASS REFINING FLUX

For use in cupola melting, also reverberatory, Swartz, open-flame and barrel type furnaces. It removes oxides and silicates. Reduces oxidation and produces a thinner slag. Ideal for grindings and general scrap.

### COVERALL BRASS FLUX

Removes gas and oxides, provides a beautiful color and better finish for red brass, yellow brass and nickel silver. Adds fluidity.

### RADIOCLARITE BRASS FLUX

Improves color, tensile strength and ductility because it chemically removes impurities such as oxides, iron and sulfur from the metal. Increases fluidity and eliminates cold shuts, misruns and shrinkage.

## DIE CASTING FLUXES AND COATINGS

### KLEN ZINC FLUX

A deoxidizer, purifier and fluidizer for zinc die cast alloys. Removes iron pickup and sulfur. Increases fluidity at lower casting temperatures. Reduces dross skimmings. Less objectionable fumes. Reduces finishing costs of castings.

### DIE COATING

For pressure die castings and permanent molds of aluminum and zinc alloys. Will not scale or blister. Does not contain fatty acids, oil or carbon and will not create gas in the molds or oxides on the casting.

### PERMANENT MOLD COATING

For aluminum and magnesium. Will withstand 3200 degrees F. Will not blister or scale. Reduces resistance to the flow of metal in the mold. Has high insulating properties, produces more uniform cooling of the metal in the mold.

### POT COATING

For iron pot melting of aluminum and white metals. Prevents iron pickup. A perfect coating for brushing or spraying melting pots or skimming rods. Will not scale or crack and resists a temperature of 3050 degrees F.

### SOFFEL'S CARBON FREE LIQUIDIZER

For feeding heads and risers of all Non-Ferrous metals. An exothermic compound for the elimination of piping and the control of shrinkage in the feeding heads. Increases the yield, decreases porosity and shrinkage and does not contaminate the metal or lower conductivity of copper.

## *THERE'S A SOFFEL FLUX FOR EVERY NON-FERROUS METAL*

**BEWARE OF IMITATIONS!**

**Specify Soffel's—The Original and the Best!**

# Pittsburgh Metals Purifying Co.

***World's Largest Producers of Quality Fluxes for All Metals and Alloys***

**1352 Marvista St., N. S.** **Pittsburgh 12, Pa.**

(*Concluded from page* 258)

1400 pounds may be tumbled in the same barrel with the same time.

Although the figures shown on the chart may not agree with your own experience, the spread in costs, in some degree, must apply to your own operations. Again, are averages sufficiently accurate to use in establishing sales policies when the very life of the foundry, in periods of diminishing demands, depends on knowing when to take an order?

**Chipping and Grinding Costs**—It is altogether too common practice among foundries to determine chipping and grinding costs of individual castings at a uniform cost per pound for all types and sizes of castings. It is a fallacious opinion that there is any consistent relationship between the weights of castings and the time required to perform this operation.

It is possible for an operator to spend an hour chipping or grinding 200 pounds of castings and the next hour chip and grind 1200 pounds. The curves on the chart show the variations in costs per 100 pounds due to the complexity of the jobs. For more detailed information concerning the results of different methods of calculating cleaning costs refer to "Cleaning Costs in a Small Gray Iron Foundry," by the author, THE FOUNDRY, November, 1946.

**Machining Costs**—Some foundries operate a machine shop. Fig. 7 shows the hourly costs to operate machines of different types and sizes in a small foundry that was serviced by the author. Although there was very little difference in the hourly wage rate of machine operators, the variable and fixed expenses were greater for the more expensive machines. Applying a uniform normal operating hour to each machine's operating cost resulted in increased hourly costing rates.

One bar on the chart indicates the break-even point as it would be determined by averaging the costs of all the machines in the group. Although the difference, in this particular instance, between the average and the individual machine rates per hour does not appear of great importance, the possible increase in clerical effort required to calculate the costs of machining castings is very small, if any. It should not be any more difficult to multiply the operating time on a job by the cost per hour than to multiply the labor cost by an average per cent for overhead. In fact, there being a uniform wage rate for all machines, the labor rate may be combined with the hourly overhead rate for each machine, thus permitting a single computation.

It is hoped that the foundry costing principles set forth herein, and the several charts illustrating the use of these principles, will be helpful to foundry executives in analyzing their own operating conditions, so that they may prepare dependable bases for establishing sales policies. The sensible use of these bases will enable them to know when to take an order and why.

## Training Course

In its endeavor to meet the training needs of industry in the southern California area, the East Los Angeles Junior College has inaugurated an in-service training course in metallurgical materials and processes. E. K. Smith, consulting metallurgist, organized and is teaching the course. Registration totals 100 men.

The course was originated as a result of consultation between the college and local business which indicated that such a training program would be of value to the industry.


They RESIST WARPAGE

. . . it's less than 0.1%

Transite Core Plates offer all these advantages:

They speed production

Core makers save trips...handle many plates at one time.

They last longer

Made of fibrous asbestos and cement, Transite Core Plates resist shock...are less likely to crack or break.

They clean easily

Core wash, sand, etc., do not stick as readily as to other materials. Both sides are usable.

They resist corrosion and warpage

Transite Core Plate surfaces stay smooth even after long service. Warpage is less than 0.1%.

They are economical

Low price, low maintenance and long life add up to low cost.

*To eliminate green cores and reduce baking time* perforated plates are also available.

For full details write Johns-Manville, Box 290 New York 16, N. Y.

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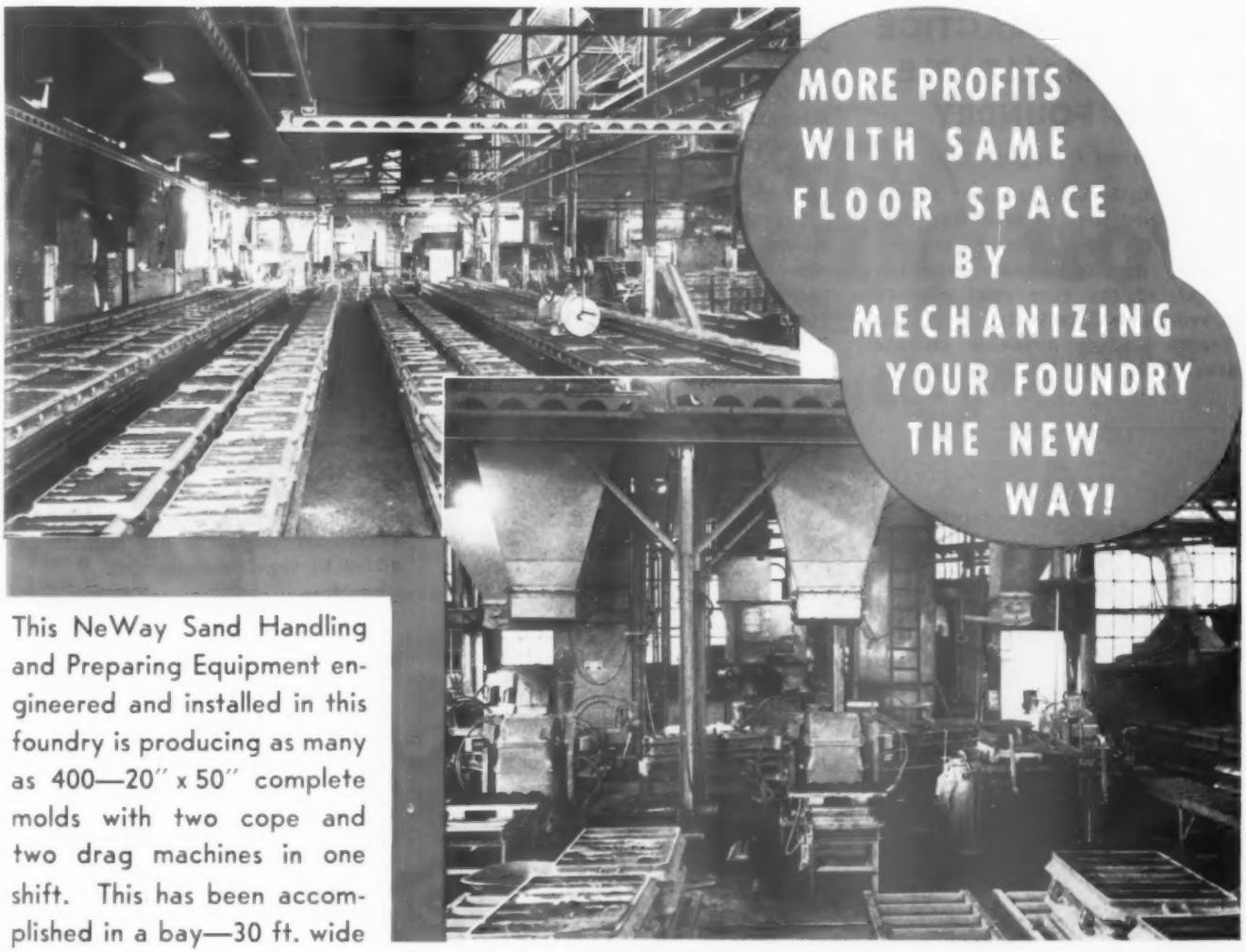
TRANSITE CORE PLATES MADE OF ASBESTOS



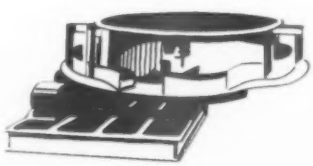
# MORE PROFITS WITH SAME FLOOR SPACE BY MECHANIZING YOUR FOUNDRY THE NEW WAY!

This NeWay Sand Handling and Preparing Equipment engineered and installed in this foundry is producing as many as 400—20″ x 50″ complete molds with two cope and two drag machines in one shift. This has been accomplished in a bay—30 ft. wide and includes the Sand Conditioning equipment and shakeout.

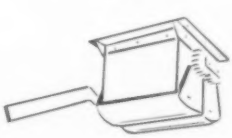
The outstanding feature of this unit is the fact that all molds are delivered to shakeout by means of a power driven conveyor, minimizing the amount of manual labor after molds are poured. In addition, the Sand Preparing Equipment of the system is being used at night to prepare sand for other floors, which makes a very economical arrangement. Our engineering and manufacturing ability is backed by 25 years experience and the resources of our competent staff of field engineers are at your service. Write or phone us.

Grey Iron Production Foundry without continuous pouring at Detroit Stoker Company, Monroe, Michigan

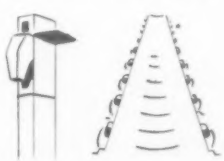
Plate Feeders



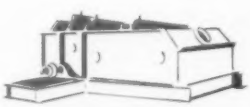
Sand Grates



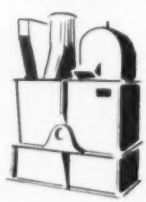
Bucket Elevators • Belt Conveyors



Aerators



NeWay Mill



## NEWAYGO ENGINEERING CO.

NEWAYGO, MICHIGAN

OFFICES IN PRINCIPAL CITIES

THE New Way LINE

Complete bulk material conveying systems, plate feeders, turntables.

# CORE SAND PRACTICE IN THE MALLEABLE IRON FOUNDRY

(*Continued from page* 122)

green strength, but, again, it should be mentioned that these absorb considerable oil. In addition, western bentonite greatly increases the hot strength of the core sand mixture and reduces collapsibility.

Cereal binders available on the market today vary as to weight per unit volume, depending upon the processing. However, when used on a weight per weight basis, they develop approximately the same green strength. It has been found by some investigators that the lighter weight flours work better in mixtures used on core blowers.

Cereal binders have some distinct advantages over clays. They do not absorb core oil as the clays do; they are quick drying, and they burn out completely in the mold, and increase baked strength.

Pitches and resins are also used in some core sand mixtures for developing baked strength, but their use is becoming relatively unimportant. The pine resins are quite inexpensive, bake rapidly and have fair collapsibility.

The synthetic binders, such as urea formaldehyde and phenol formaldehyde, are becoming more popular, but these constitute a large subject in themselves, and will not be discussed here. Considerable literature is available on this subject.

Practically all of the malleable iron foundries in the United States today use some form of core oil to develop baked strength in their cores. The most commonly used oils are either vegetable oil bases or petroleum base oils. Usually thinners and resins are added to the vegetable oils. Petroleum polymers are sometimes added to vegetable oils also.

### Require Heat and Oxygen

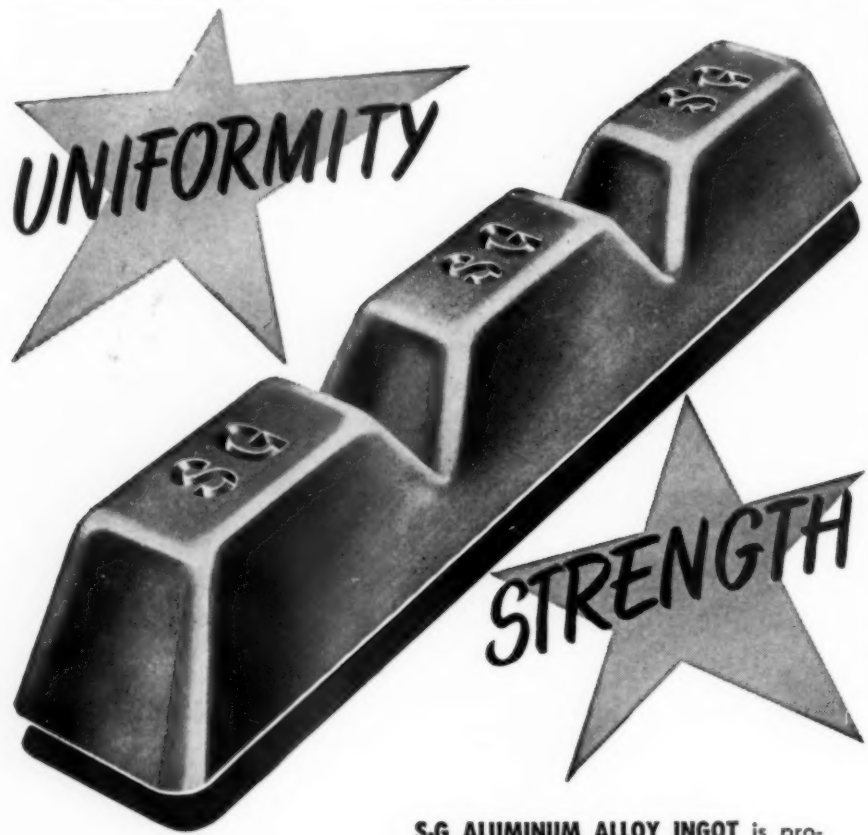
The vegetable oils, chiefly linseed oil, require oxygen as well as heat to develop their baked strength. The oil actually combines with oxygen to form a solid substance which binds the sand grains together. When petroleum polymers are added to vegetable oils, an additional polymerization takes place along with the oxidation. The petroleum polymer oils, on the other hand, require less oxygen to develop their baked strength, and continue to polymerize on heating. This reaction causes a change from the liquid to the solid state. The polymer oils usually are somewhat faster baking oils; that is, they develop their maximum strength in a shorter time. In addition to developing their maximum strength rapidly, these oils maintain this strength over a longer baking period, thus permitting the baking of a wide range of core sizes at the same time.

A good blended core oil will peak higher than pure linseed oil. Both the linseed base oils and the petroleum base oils develop their maximum strength at approximately 400° F.

Some foundries purchase core oils according to definite chemical specifications. Although it is well to know these characteristics, the main proof of any oil is in the cores it will produce. The baked strength and the hardness of the cores produced, the baking time required and the amount of gases developed when the molds are poured are all important considerations in judging any core oil.

Other materials are often added to core sand mixes to promote rapid collapsibility of the core in the mold. These materials impart no green strength, but merely serve as fillers.

(*Concluded on page* 264)




**S-G ALUMINUM ALLOY INGOT** is produced by craftsmen whose skill and know-how assures you of uniform raw material with which to work. For all types of castings — Die — Permanent Mold or Sand Cast — aluminum alloys trademarked **S-G** are recognized for their uniform quality and the way they meet the most rigid specifications both as to chemical and physical analysis. Our complete modern research and testing laboratory facilities are available to aid you at any time.

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V40F

473

# IT'S ALL IN KNOWING HOW!

## -IN JUGGLING OR BALANCING CORE OILS

V50F

Unlimited
technical resources
and endless experiment have fashioned
Velsicol's balanced core oils
for every core making problem

V35T

**CORE OILS for**

- Clean — clay free open sand
- Sand containing fines and clay
- Castings susceptible to hot tears and difficult core removal
- Castings requiring cores with high hot strength
- Light sectioned castings
  Heavy sectioned castings
- Iron or steel castings
  Non ferrous castings

# VELSICOL Corporation

•

General Offices: 330 East Grand Avenue, Chicago 11, Illinois

•

*Representatives:*

*In Principal Cities*

(*Concluded from page* 262)

Wood flour is now quite commonly used to produce the collapsibility necessary in making certain types of malleable castings.

The selection of the proper ingredients for the core sand mixes must be followed by careful weighing or measuring, and proper mixing, if uniformly good results are to be obtained.

As already mentioned, the sand should be dry as it comes to the mixer, if this is economically possible. Weighing of sand is considered more satisfactory than measuring by volume. Dry materials added to the mix should also be weighed because of the difference in density and the manner in which they pack down in the measure. Liquid materials, such as water and oil, are naturally measured by volume.

The proper sequence of the addition of materials is likewise quite important. Although there is some disagreement, the prevailing opinion is that the dry materials should be mixed for at least one minute, the water should then be added, and finally the oil should be added.

It is a well known fact that the length of mulling time has a definite effect upon the green strength of the sand, particularly when cereal binders are used. As mulling time increases, the green strength also increases. This relationship continues until maximum strength is attained, and then the curve levels off. It can easily be checked, and should be the basis for determining the optimum mulling time. This relationship is shown in Fig. 2.

Once satisfactory sand mixes have been developed, they should be carefully maintained. Quite often the sand mixer is influenced by the coremaker, and varies the mix accordingly. This practice should be discouraged, and the mixing of sand should become a science rather than an art.

This discussion has dealt only with basic fundamentals that we all recognize, but it is common knowledge that most of our coreroom problems develop because we fail to consider these simple facts.

Assembling pattern for "stockless" anchor

WOOD-LOK replaces hot animal glue. It permits patterns to be handled and machined after 15 to 35* minutes clamping time — instead of 6 to 8 hours. It sets faster than hot animal glue . . . provides ample open assembly time for accurate registration . . . produces an extremely strong moisture-resistant bond that gives a high degree of shock resistance in handling.

WOOD-LOK is a liquid resin glue that comes ready for use. It is used cold. Therefore, its bonding quality is never weakened by constant reheating. Nothing has to be added, soaked or heated. No need to stop production to mix fresh glue or to warm-up constantly hardening glue.

WOOD-LOK has been fully shop tested for one year . . . is in full supply . . . available in steadily maintained deliveries. Write for a sample. Address: 270 Madison Ave., NEW YORK 16; 3641 So. Washtenaw Ave., CHICAGO 32; 735 Battery St., SAN FRANCISCO 11, and other principal cities. In CANADA: Meredith, Simmons & Co., Ltd., TORONTO and MONTREAL. In ENGLAND: National Adhesives, Ltd., Slough.

National ADHESIVES

EVERY TYPE OF ADHESIVE FOR EVERY INDUSTRIAL USE


## OHIO FOUNDRY CONFERENCE

(*Continued from page* 155)

tem.

Walter Sicha, Aluminum Co. of America, Cleveland, on Saturday morning delivered the third nonferrous paper, entitled "New Developments in Determining the Fluidity of Aluminum Castings Alloys." Test procedure for determining fluidity involves the pouring of a casting in the form of a spiral ribbon in a green sand mold which has been made on a squeezer machine to eliminate ramming differences. Metal pouring temperature is controlled within 5°F. A crucible holding about 20 lb of metal is used, and three to five spirals are poured to establish a fluidity value for any individual lot of metal. Ordinarily the fluidity rating is based on the volume of the spiral in precision work, but informative comparisons can be made on the basis of spiral weights.

During the discussion period Mr. Sicha stated that metal characteristics can be held constant and mold characteristics altered to get the same usable test results. As to whether fluidity ratings of various alloys correlate with experience in the foundry, he said that the correlation was good in most cases. In conclussion, Mr. Sicha said that a knowledge of the following characteristics would provide a good basis for judging alloys: Fluidity, hot cracking,

(*Continued on page* 266)

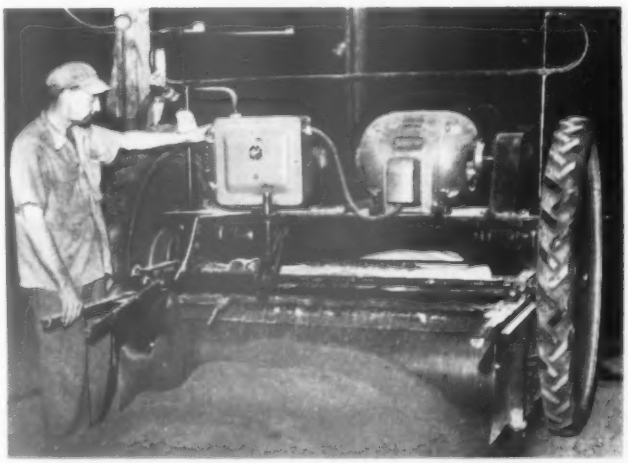
# The New Moulders' Friend

*Reversible Moulders' Friend Adding Water to the Sand in First Trip Over the Heap*

**WETS DOWN AND CONDITIONS THE SAND IN ONE OPERATION**

As The Moulders' Friend propels itself over the heap thousands of flat, tempered steel wires in the brush revolving at high speed pick up small particles of the used sand, added bond and moisture and blend them thoroughly.

This action is so thorough that water can be added to the sand directly ahead of the machine. A minimum of moisture will be distributed uniformly over the heap.



*A Small Amount of Water Is Added in the Return Trip Over the Heap to Give Exactly the Moisture Content Desired*

*"The Moulders' Friend"*

**Sand Conditioning Equipment**
**Dallas City, Illinois**

(*Continued from page* 264)

and feeding characteristics.

Concluding nonferrous session consisted of a roundtable discussion on the subject "New Developments in Nonferrous Melting Equipment and Practice." Each of the speakers discussed the melting equipment and practice at his plant.

Fred Glass, Deming Co., Salem, O., covered tilt-type combination burner furnaces; Jack Ziessman, Grabler Mfg. Co., Cleveland, open flame furnaces; W. R. Huffman, H. B. Salter Mfg. Co., Marysville, O., electric arc furnaces, and W. J. Doelker, National Cash Register Co., Dayton, O., high frequency lift coil induction furnaces. The entire group entered into a discussion of the merits of the different types of melting equipment, costs and maintenance problems. R. W. Parsons, Ohio Brass Co., Mansfield, O., was chairman.

The first session on steel castings featured a paper, "Good Housekeeping Pays Off," by Robert G. Scott, personnel and safety director, Commercial Steel Castings Co., Marion, O. Robert Jansen, Unitcast Corp., Toledo, was chairman. Mr. Scott described the good housekeeping program of his own organization, and stressed the importance of the results which have been obtained.

A good housekeeping program should include proper planning to provide space for operation. Aisles should be ample, and sufficient space should be provided materials stored indoors. Cranes, hoists or conveying equipment should be provided to pile materials properly, and this orderly storage must be maintained. Buildings and equipment should be kept in good condition, and should be painted as often as necessary.

Lighting should be ample, and the sources of illumination should be kept clean. Where it is not possible to eliminate dust entirely, it should be collected at the source. Proper ventilation of the plant interior should be provided. The speaker stressed the point that clean-up work cannot be done successfully by regular foundry workers after their other work is completed. Men should be designated to do nothing but clean-up work.

### Has Many Advantages

As proof that good housekeeping pays off, Mr. Scott stated such a program results in longer life and more efficient operation of equipment, less accident costs, higher morale and greater efficiency of workers, reduction in silicosis and fear of silicosis, and greater ease in hiring and retaining good foundry employees.

A preliminary report on an investigation of penetration of steel into baked sand cores was presented by A. J. Kiesler and R. T. Girard, works laboratory, General Electric Co., Schenectady, N. Y. The first part of the investigation has dealt with the effect of core density, permeability, and size and shape of sand particles on penetration, but the study will include consideration of 10 other properties.

Thus far, the work indicates that by proper gradation of particle sizes, penetration can be controlled. If this gradation is controlled, ramming may cover a wide range without ill effects. Density is a function of particle size and ramming force, assuming the flow characteristics are kept constant. Proper gradation gives maximum density with the least ramming force. A core of low permeability with high density gave satisfactory results—no blows or scabbing, when thoroughly baked. The speakers pointed out that this gives rise to the debatable question as to just how much permeability really is needed for successful core mixtures.

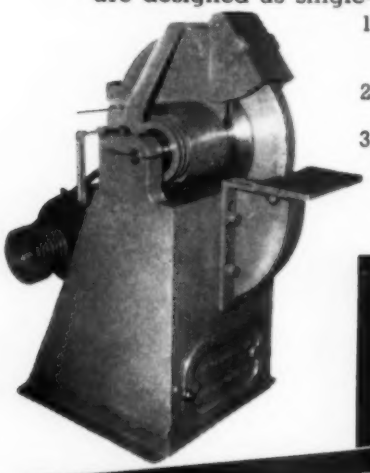
(*Continued on page* 268)


**High-Speed PRODUCTION**

**FOR THE FOUNDRY**

Three important reasons why FOX Grinders are designed as single-wheel machines:

1. Speed changes can be made at the proper wheel diameter.
2. Less space is required for each installation.
3. Proper operating room is provided on either side of the wheel.



**FOX**

HIGH SPEED
**STAND GRINDERS**

These Stand Grinders have been designed for use in foundries where high-speed production is required. Maximum clearance at the grinding face has been provided in both units to properly take care of the innumerable casting shapes encountered throughout the foundry industry.

Comes in 4 sizes: 20" light duty—24" light duty—24" heavy duty —30" heavy duty.

**FOX GRINDERS, Inc.**

OLIVER BUILDING PITTSBURGH 22, PA.

**We can't even guess the number of chill nails we have supplied to the foundry industry during the 77 years we have been in business.....all we know is that we have a good product proved by sales.**

**CHILL NAILS FOR EVERY PURPOSE**

STEEL
BRASS
STAINLESS
ALUMINUM
"KOOLHEAD SPIDER CHILLS"
HORSE SHOE NAILS

*CONTROL CHILLING for BETTER CASTINGS*

STANDARD HORSE NAIL CORPORATION
NEW BRIGHTON, PENNA., U.S.A.
CHILL KOOLHEAD NAILS
COLD FINISHED HOT FORGED

*Founded in 1872, the Standard Horse Nail Corp. first supplied chill nails to the foundry industry as a sideline. Today, that "side line" . . . (chill nails for every purpose) is accepted by foundrymen everywhere, because foundrymen know a good product at sight.*

**STANDARD HORSE NAIL CORP.**

New Brighton, Pennsylvania

(*Continued from page* 266)

Mr. Kiesler stated that while the project is far from complete, enough work has been done to show that penetration can be minimized by closing the larger voids in the core. At the same time it is evident that tightening the mix by using fines or harder ramming results in veining. Veining seems to start at a 50-52 per cent concentration of fines below 140-mesh if these mixes are rammed to a density of 1.58 or higher. Penetration becomes predominant when fines (below 140-mesh) are below 30 per cent. When there is less than 11 per cent of such fines, penetration is very severe.

The third steel session was devoted to a discussion of "Foundry Uses of Metallurgical Oxygen" by George E. Bellew, Air Reduction Co., New York. William H. Heimberger, Buckeye Steel Castings Co., Columbus, O., was chairman. The major portion of the presentation was devoted to the introduction of oxygen to basic and acid electric furnace melting. Major benefits developed through this practice include increased melting rate, higher bath temperatures, faster carbon removal, and conservation of costly alloys. Other useful factors are better control, a more vigorous carbon boil, and reduced casting porosity. Mr. Bellew concluded that oxygen has a definite place as a production tool in electric furnace practices, regardless of the grade of steel being made or the type of furnace employed.

"Modern Application of Radiography in the Steel Foundry" was the subject of a paper presented by R. M. Landis, General Electric X-Ray Corp., Cleveland, at the final steel session. Dr. Clarence E. Sims, Battelle Memorial Institute, Columbus, O., was chairman. Mr. Landis outlined the application of the x-ray in the foundry industry, and discussed the method of making an inspection by the method. He indicated that the x-ray can be applied to the examination of castings in the following ways: For 100 per cent or routine inspection of production; in research and development laboratories; for inspection of weld repairs; for development of molding practices; and for quality control.

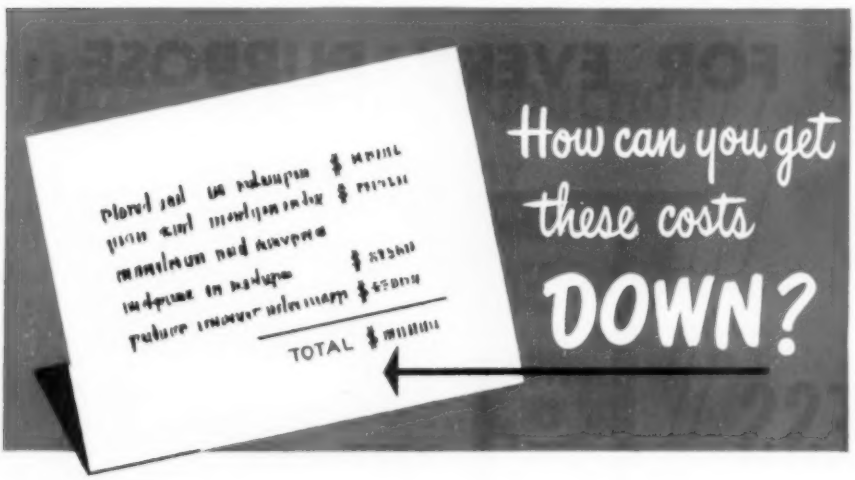
**Establishes Production Methods**

Perhaps the establishment of production practices is the most universally accepted application of radiography in the foundry industry. Here the process is employed for a variety of purposes, such as investigating proper size and position of gates, risers, feeders, vents and chills; increasing the yield by redesign and simplification of mold; establishing proper pouring temperatures and studying core problems.

At the first of the four malleable iron sessions, presided over by John W. Clarke, General Electric Co., Erie, Pa., Vincent J. Sedlon, president, Master Pattern Co., Cleveland, gave a comprehensive discussion of pattern requirements in malleable castings production, and illustrated by slides various types of patterns and coreboxes. Pattern specifications and allowances were listed covering molding, coring and machining. He emphasized the importance of revising casting design in the interest of minimizing molding problems.

Milton Tilley, National Malleable & Steel Castings Co., Cleveland, spoke at the second session on the subject of metallurgical problems created by scrap. John Manos, Lake City Malleable Inc., Ashtabula, O., presided. Mr. Tilley indicated that residual alloys in scrap will continue to be a problem to the foundry melter in view of the steady increase in amounts of alloyed materials in use.

(*Concluded on page* 270)




THE CORE OF THE PROBLEM IS
LOWER COSTS THROUGH . . .

1. Lower core scrap
2. Higher sand-oil ratios
3. Reduced baking time and temperatures
4. Lower cleaning costs
5. Less casting scrap

You can have these savings by inviting a Swan-Finch Engineer to study your foundry conditions and recommend a core mix using Safco Core Oils. A postcard or letter will bring him quickly. Or, if you prefer, ask for literature which we will be glad to forward by mail.

SWAN-FINCH OIL CORPORATION
RCA BLDG. WEST • NEW YORK 20, N. Y.

## Refractory CEMENTS for melting non-ferrous metals

For melting all non-ferrous metals — in pit furnaces, direct arc type rocking furnaces, induction and high frequency furnaces — Norton Company has a complete line of high temperature cements and prefired shapes. For example:

**RC 1188** — a silicon carbide mixture for ramming into oil or gas fired reverberatory and pit furnaces melting aluminum (also copper and zinc).

**RM 1169** — a fused magnesia cement for lining Ajax-Northrup high frequency furnaces melting nickel-chromium alloys.

**RA 889** — a fused alumina mixture for lining burner tunnels in gas or oil fired billet heating, heat treating and annealing furnaces.

**RM 1140** — a fused magnesia cement for rammed linings in Ajax-Wyatt low frequency vertical ring induction furnaces melting high copper alloys, and cupro-nickel, nickel-silver and cadmium-bronze alloys.

**NORTON COMPANY**
**Worcester 6, Massachusetts**

NORTON®
REFRACTORIES

(*Concluded from page* 268)

Such alloys include molybdenum and chromium, with aluminum, lead and tin other elements which can cause trouble in melting. The speaker described various of the typical difficulties encountered by malleable foundries the last few years because of shortage and inferior quality of scrap, together with the remedies applied. In conclusion he emphasized the important role occupied by the foundry melter.

"Gating and Risering of Malleable Castings" was discussed by Harold Sieggreen, Central Foundry Division, General Motors Corp., Saginaw, Mich., at the third malleable session, presided over by S. E. Kelly, Eberhard Mfg. Co., Cleveland. Mr. Sieggreen showed slides illustrating gating methods for various types of castings. Recommendations offered for gating and risering included the following: Place gates for subsequent easy removal; don't feed heavy sections through thin ones; make feeders large enough to stay hot as long as necessary and locate them as close to the casting as possible; provide generous fillets at all junctions.

The concluding malleable session comprised a talk on "Finishing Control" by John Zeindler of Albion Malleable Iron Co., Albion, Mich. Finley Edmundson, Lake City Malleable Co., Cleveland, was chairman. Mr. Zeindler described how his company eliminated a bottleneck in its cleaning department through more efficient utilization of existing equipment, better handling and improved control in other departments. Mr. Zeindler's paper is presented in full elsewhere in this issue.

The program at the Saturday luncheon concluding the conference was sponsored by the Foundry Educational Foundation. Luncheon chairman was D. E. Krause, Gray Iron Research Institute Inc., Columbus, with George K. Dreher, Foundry Educational Foundation, discussion leader.

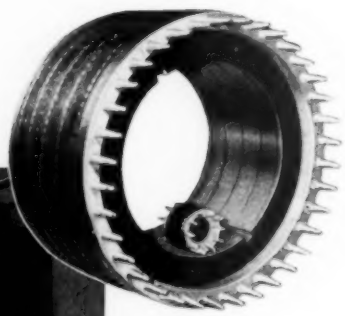
Five speakers discussed the subject, "The Employer Looks at the Engineering Graduate," by describing training programs in operation at their respective companies. The speakers were Walton L. Woody, National Malleable & Steel Castings Co., Cleveland; Herman Ewig, Cincinnati Milling Machine Co., Cincinnati; William J. MacNeill, Dayton Malleable Iron Co., Dayton, O.; John M. Price, Ferro Machine & Foundry Co., Cleveland, and Victor E. Zang, Unitcast Corp., Toledo, O.

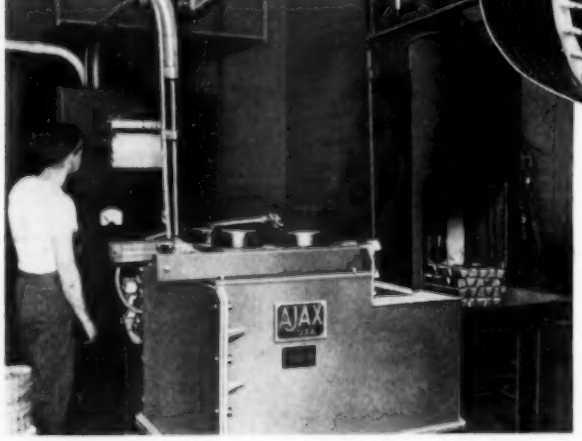
## Sales Training Booklet Offered

To provide executives with practical assistance in reviewing or developing sales training, the Policyholders Service Bureau, Metropolitan Life Insurance Co., One Madison Ave., New York 10, in co-operation with the National Federation of Sales Executives and the National Society of Sales Training Executives, has published a report, "Training Salesmen," which contains the results of a survey of selected companies with progressive sales training programs.

The report includes information on the setup of successful sales training organizations, the development of a training program, how to keep the program practical, how to present the program, training methods available, size of the training group, training aids, outline and guides for conference leaders, and training facilities. Also included are charts showing the training organizations of several companies, job descriptions of sales personnel and training representatives, and sales training program outlines.


AJAX SOLVES THE PROBLEM!





*Above:* Thirty-inch Aluminum Rotor casting by the Reliance Electric and Engineering Company, Cleveland, at their Ashtabula, Ohio plant.

*Left:* Ajax 60 KW Twin-coil Stationary Induction Furnace at Reliance.

AJAX ELECTRIC INDUCTION FURNACE HELPS INCREASE ALUMINUM ROTOR CASTING EFFICIENCY

The Ajax-Tama-Wyatt Induction Furnace at the Reliance plant plays a major part in their successful large scale production of Aluminum Rotor Castings.

The Ajax-Tama-Wyatt Electric Induction Furnace used for melting the metal preparatory to casting, is lined with a special composition to avoid contamination of high purity aluminum with silicon or iron. Temperature control of the molten metal to within one per cent or less is another advantage of this furnace.

From 30 to 40 per cent less floor space is required for the Ajax-Tama-Wyatt Electric Induction Furnace than is required for any other. There are no fumes—shops are cooler. Operation is almost silent—working conditions are better. You'll have better labor relations, and more efficient operation through greater shop comfort when you install Ajax Induction Furnaces. Available in a wide range up to 1,000 KW., 20,000 pound capacity.

Ajax Engineers have been the pioneers in Induction Furnaces for all metals since 1917. For technical details and full information contact:

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AJAX TAMA-WYATT INDUCTION MELTING FURNACE

Associate Companies: AJAX METAL COMPANY, Non Ferrous Ingot Metals and Alloys for Foundry Use
AJAX ELECTROTHERMIC CORP., Ajax Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC., The Ajax-Hultgren Electric Salt Bath Furnace
AJAX ELECTRIC FURNACE CORP., Ajax Wyatt Induction Furnaces for Melting

## SAFETY IN MANUAL HANDLING

(*Continued from page* 100)

all others are required to wear glasses with safety lenses. Everyone is encouraged to wear safety shoes, and iron pourers must wear shoes without laces. They are also required to wear wool trousers faced with chrome leather and protective leggings, which we furnish. Cupola repairmen must wear protective safety hats while relining inside the cupola and all people working in areas which are hazardous with respect to falling objects wear foot guards.

Watch piled material, see that it is solid and keep it properly trimmed. Block or chock material to prevent rolling or sliding.

The work place area should be properly illuminated, the workway surface should be adequate, strong enough and safe enough. Consideration should also be given to conflicting traffic from other operations.

### Exercise Special Care

The utmost of care must be exercised in the handling of objects which present special hazards, such as corrosive chemicals, hot materials, cold materials, electrically charged apparatus, toxic compounds, etc. All of these require special consideration, such as protective safety clothing, mechanical safety devices and special instructions regarding personal hygiene to be employed after handling exposure.

After all the foregoing factors have been considered, we then come down to the piece itself. We should always consider its weight, bulk factor such as size and shape, the frequency of handling, how high or low it has to be lifted or stacked, the carrying distance between pickup and delivery. Then weigh all these factors against the qualification of the man we are assigning to do that particular job.

Remember that some people cannot seem to co-ordinate the action of hands, feet, arms and mind at the same time; they have a slow reaction time while others are especially good on co-ordination and these people are especially adept at repetitive operations. Remember, too, that many of us are victims of habit. I remember one humorous incident that will illustrate this. Recently we had a new employee who was unloading cores from a rack. He had previously been employed in a dairy washing bottles. One day one of the cores slipped from his hands and fell towards the floor, striking this man on the arch of the foot and causing a lost-time accident. When questioned, this man admitted that he had been taught in the dairy when handling milk bottles to put out his foot to break the fall in case any fell from his hands, to prevent breakage of bottles if possible. And so because of a habit which he had formed at his previous place of employment he had inadvertently put out his foot when the core dropped, to break its fall, and instead of saving the core he broke the arch of his foot.

I sometimes think that we consider many jobs so simple because there are no machines connected with the operations to cause concern about safety, yet statistics show that more people are hurt at home than in industry—and certainly in the home there are very few machines connected with any injuries.

We can invent, engineer and install the best safety devices to prevent people from being injured but the only real safety device is the

Ajax phosphor copper,

like all Ajax alloys, is produced under rigid laboratory standards to constant formulae. In relation to total cost, Ajax alloys give greater performance. No product can do more . . . so protect your quality work with Ajax alloys.

AJAX METAL CO., PHILADELPHIA 23, PA.

ASSOCIATE COMPANIES: AJAX ELECTRIC • AJAX ELECTROTHERMIC CORP. • AJAX ELECTRIC FURNACE • AJAX ENGINEERING

one we carry between our ears and remember always our need to think safety, talk safety, and set a safe example 24 hours a day. Remember also that making the job easier from a physical standpoint does not always make it easier from a safety standpoint.

We must assume and fulfill our responsibility as supervisors for accident prevention, and a smart supervisor soon learns that the key to the situation is the man himself. Each man is an individual, no two of whom are exactly alike, yet we go blindly ahead and expect people to react exactly alike in a given set of conditions.

We condemn people many times because they fail to think and see as we do. Make allowances for the fact the man you are supervising may not be as smart as you are or may not think or react as quickly as you do, yet he may be an ideal man for the job if properly handled.

A modern supervisor will study each of his men and find the key to each man on an individual basis. This can be done only by being close enough to his people to know them thoroughly, understand their habits personally and to enjoy their confidence to an extent they will share some of their personal problems.

Webster's definition of safety is "freedom from injury while on the job." Let us assume our responsibility in making it a reality.

FOR EVERY FOUNDRY PURPOSE
Goose Lake
FIRE CLAYS
• The most widely used of all fire clays in midwest foundries. They supply every bond and refractory requirement. These clays are prepared in a large, modern grinding plant, which for 32 years has served the foundry industry with prompt and dependable shipments.
Valuable consultation is available with experienced engineers for the best use of fire clays in foundry bond and refractory service. They often supply important help for the reduction of foundry scrap losses.
A new booklet with many pictures about the production of Goose Lake Fire Clays is available upon request. Write now for your copy.
Make "your" next car of fire clay GOOSE LAKE
Illinois Clay Products Company
FIRE CLAY · CLAY BOND · BRICK · BLOCK
JOLIET, ILLINOIS


## QUALITY CONTROL IN THE FOUNDRY

(*Continued from page* 104)

arrive at a simple control that could be applied in the foundry to predict machinability. Since it happened that high silicon content would improve machinability, it was desirable to have a simple test which could be made to determine the silicon content at the holding furnace area. It was felt that perhaps a hardness test would give some indication of the amount of silicon. Fig. 8 shows the correlation which was found to exist between per cent silicon content and brinell hardness of test bars. For each 0.1 per cent silicon content, the hardness is lower by 8 to 10 points on the brinell "B" scale.

### Quick Test Available

Now there exists a quick test which can be made in the foundry which will predict machinability effectively. A portable hardness tester was secured and the test blocks tested for hardness. Whenever the test blocks showed a hardness of 190 bhn, steps were taken to increase the silicon content by silicon inoculation at the holding furnace area until a hardness value of below 190 bhn was obtained. Fig. 5 may be of interest in that it shows the change in brinell hardness due to silicon inoculation. It will be noticed that inoculation has the effect of reducing brinell hardness by about 15 points. Of particular interest is the fact that the amount of inoculation that can be made is definitely limited. Excessive inoculation is simply a waste of inoculant. This means that the best iron must be relatively high in silicon at the start.

Silicon content was not the complete answer insofar as the carbon content of the iron did not remain constant. Further investigation indicated a definite relationship between carbon equivalent and casting hardness. Assuming silicon to be one-third as effective as carbon in its graphitizing influence from the equation C.E. = % C + 1/3 % Si, data accumulated indicated satisfactory hardnesses with a carbon equiv-

(*Concluded on page* 274)

This No. 404 Clearfield Mixer has been in operation for eight years in the core shop of the Railway and Industrial Engineering Co. of Greensburg, Pa., makers of electrical switchgear for substations and generating stations. During that time it has required only very few minor repairs and "has paid for itself many times over."

*in preparation of foundry sand*

The

# CLEARFIELD mixer

## "Pays For Itself Many Times Over"

By its speed, its dependability, its flexibility—by the high quality sand it turns out—the Clearfield Mixer cuts costs and speeds production. In the unsolicited words of one of our satisfied customers "it pays for itself many times over."

Clearfield Mixers, featuring the famous revolving pan principle, are available in a wide range of sizes. There is a Clearfield Mixer to meet any sand preparation requirement you have, either as a single process or part of an integrated system.

Write today for Catalog No. 79
for complete details.

CLEARFIELD MIXER
MIXES, TEMPERS AERATES

CLEARFIELD MACHINE COMPANY
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# IT'S SO EASY

*to Mark*

**HOT or COLD CASTINGS with MARKAL PAINTSTIKS**

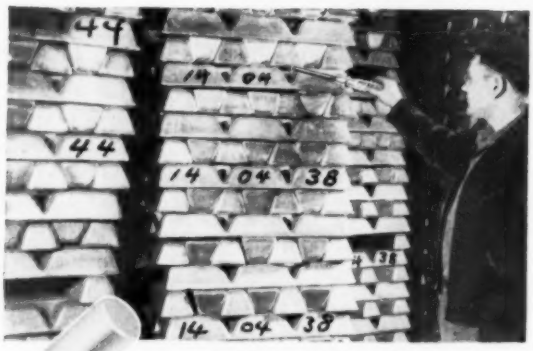



Photo at Apex Smelting Co., Chicago

Tell us your marking problems. We will solve without obligation.

*Write for FREE SAMPLES*

**MARKAL "A"** for hot castings, welding and cold parts to be annealed at high temperatures. Range 60° F to 1200° F.

**MARKAL "H"** For hot castings, plates, slabs, billets and forgings. Range 150°F to 1400°F.

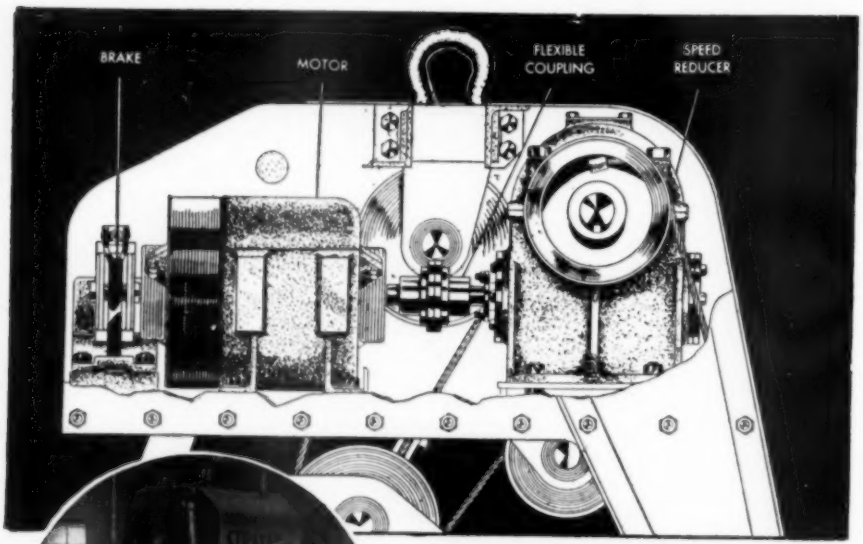
**MARKAL "HT"** For extremely hot surface markings. Dries instantaneously. Range 250°F. to 1800°F.

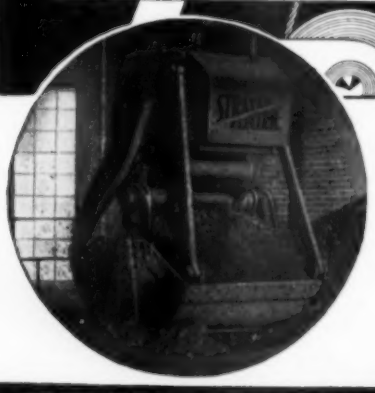
**MARKAL "M"** For marking metal surfaces from 0°F to 160°F which are to be annealed at temperatures up to 1800°F. Marks withstand immediate quenching in water or oil. Marks will not "run", "char", "flow", "discolor", "peel" or "crack".

**MARKAL "B"** For cold rough or smooth, dry, oily or wet surfaces.
**MARKAL "C"** For cold smooth surfaces requiring instantaneous drying.
All Types **FADEPROOF, WEATHERPROOF, PERMANENT.**

**MARKAL CO. 3056 W. Carroll Ave. CHICAGO 12, ILL.**





## HOOK 'ER ON—PLUG 'ER IN

ABOVE YOU SEE WHY the Erie Electric Bucket works in its own headroom controlled from the crane cab. This sturdily constructed bucket needs only to be hooked over the crane hook and power line plugged in. The man in the cab controls the opening of the bucket from cracking the lips to any degree of opening or closing. The extra in-built weight permits easy penetration. *Write for complete particulars.*

ERIE STEEL CONSTRUCTION CO
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**ERIE BUCKETS** THE MOST COMPLETE LINE BUILT

» ALSO AGGREMETERS
ELECTRIC OVERHEAD CRANES
PORTABLE CONCRETE PLANTS


*(Concluded from page 272)*

alent of approximately 4.5.

Investigations were also conducted to determine the effect of cooling rate on casting hardness. Using pouring temperatures as an indication of relative cooling rates, it was possible to correlate satisfactorily temperature of the iron and brinell hardness. Fig. 6 shows two charts on the same chronological scale. The upper chart shows the pouring temperature in degrees F, and the lower chart shows the brinell hardness number. It will be noted that during the first period under observation, the pouring temperature averaged 2520° F and yielded test blocks having a brinell hardness of about 195 bhn. During the second period, the pouring temperature averaged 2470° F, and the brinell hardness increased to 242 bhn. Castings produced during the second period were definitely not machinable.

### Write Process Specification

By reviewing the information available from the charts, it was possible to write a process specification for making ¼-hp motor end bells which will be physically sound and which will not require annealing. These specifications are simple: Maintain carbon content at 3.45 to 3.65 per cent; maintain silicon content at 2.50 to 3.10 per cent; and maintain temperature of metal poured into molds at not less than 2500° F.

The quality control problems in the foundry are no different than the quality control problems in the machine shop or in the assembly section. It is first necessary to realize that a problem exists, and still further necessary to state the problem. It is necessary at the very outset to define the particular quality characteristics for which control is desired. It is necessary to establish minimum quality requirements for those particular characteristics.

This case history serves to show how foundry quality problems can be studied and controlled. The controls established are not expected to be final and much remains to be learned about the tests to be made on foundry products to enjoy full control of quality of all castings. A successful beginning has been made at Westinghouse, and more use of quality control techniques in the foundry will be realized in the future.

---

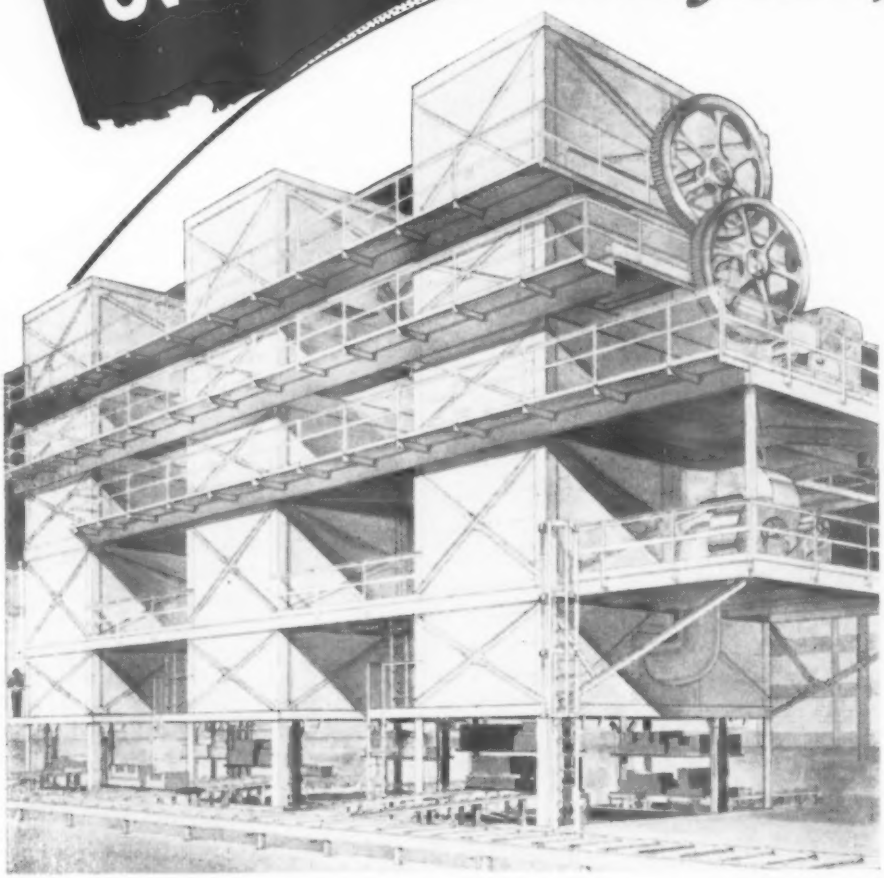
Bearing Bronze Castings Co., 3515 East 82nd St., Cleveland, recently suffered $9000 fire loss.

# Outstanding Vertical Oven Installation

*made for Large Steel Castings Co.*

*by*

# CARL-MAYER



**Dimensions (each oven)—67'0" top to bottom x 11'2" x 20'0" cross section.**

**Load per carrier—5 tons.**

**Load per oven—80 tons per bake, maximum.**

**Gas Fired Recirculating Heater Principle; fully automatic.**

**Semi-automatic loading; automatic unloading.**

•

**CARL-MAYER PATENTED** (pat. no. 2,257,180) **RECIRCULATING HEATING SYSTEM,** obtainable only in Carl-Mayer Ovens, assures unusually fast and uniform baking with amazing fuel economy.

**CARL-MAYER DESIGN** also keeps working conditions comfortable because heat and fumes are removed from the cores before they reach the unloading zone.

**CARL-MAYER CONSTRUCTION** is unusually rugged—keeps maintenance low.

**WRITE FOR BULLETIN** showing the extensive line of Carl-Mayer Core and Mold Ovens.

## OTHER CARL-MAYER VERTICAL OVEN INSTALLATIONS FOR CONCERNS SUCH AS—

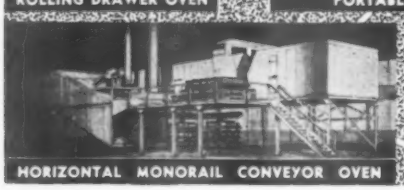
| | | |
|---|---|---|
| Aluminum Co. of America | Ford Motor Co. | Harrison Radiator Corp. |
| Cadillac Motor Co. | Fremont Foundry Co. | Packard Motor Co. |
| Eclipse Aviation Corp. | General Motors Corp. | H. B. Salter Co. |
| Electric Autolite Co. | General Steel Castings Corp. | Union Brass & Metal Mfg. Co. |

ROLLING DRAWER OVEN

PORTABLE RACK OVEN

VERTICAL OVEN

CAR TYPE OVEN



HORIZONTAL MONORAIL CONVEYOR OVEN

## The CARL-MAYER Corp.

3093 EUCLID AVE. CLEVELAND, OHIO

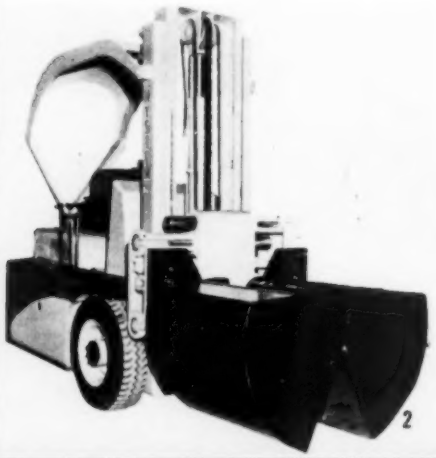
## CORE AND MOLD OVENS

# NEW Equipment AND SUPPLIES

**(1)—Core Tester:** Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4—Green core impact tester is designed to determine the effect of jolting a core during transport, how well overhanging parts will hold, and whether a cylindrical core will stand rolling out onto a plate. The number of jolts required to crack a core is a measure of the ability of a core mixture to be rolled onto a plate. Overhang possibilities are measured by jolting a test core formed with an overhang. A dial indicator measures the slump suffered by a core when subjected to a standard jolt. The tests are intended as an aid in designing and controlling core mixtures to do their job effectively.

1

**(2)—Bucket Attachment:** Hyster Co., 2902 N. E. Clackamas St., Portland 12, Oreg.—Clamshell bucket of 7/16-cu yd capacity is available for the company's 4000-lb capacity lift truck. The unit mounts on the sliding supports of the basic Load-Grab (palletless materials handling attachment) as optional equipment. Operated by a lever at the driver's right, the clamshell opens and closes by the same hydraulic power which spreads and contracts the arms of the standard grab mechanism. A standard lifting height of 8¼ ft to bottom of the closed bucket adapts it to such operations as loading and unloading trucks and railroad cars.


2

**(3)—Sand Conditioner:** Beardsley & Piper, Division of Pettibone Mulliken Corp., 2424 North Cicero Ave., Chicago 39—Machine is designed to accomplish complete sand conditioning from loading to discharging and to provide thoroughly blended, iron-free, evenly tempered and fully aerated sand for molders. The machine is self-propelling at speeds of 4½ to 36 fpm forward and reverse. It is said to have a capacity of approximately 40 tons per hour, dependent on screen mesh. Other features include self-loading (prior windrowing unnecessary), blending, magnetic separation, breaking lumps and screening, double aeration and windrowing or piling. Machine is available for 220, 380, 440 or 550 v, 2 or 3 phase, 50 or 60 cycle current.

**(4)—Crane Cab:** Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.—Operator of the new style crane cab sits in a restful arm chair and has a lateral vision of 2/3 of a circle and can see almost straight down. Cab is equipped with magnetic

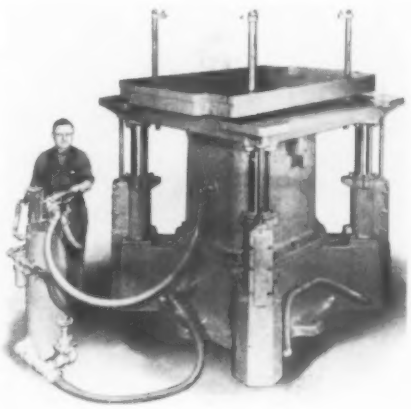
3

4

switching controls, and all crane movement is governed by a slight pull or push on short, ball-tipped levers connected to low voltage multipoint time delay speed controls. Cab is weatherproof and may be provided with air conditioning, telephone communication, and fluorescent lighting if desired.

**Smoke Indicator:** Photoswitch Inc., 77 Broadway, Cambridge 42, Mass.—Photoelectric smoke indicator consists of a photoelectric control and light source. These are mounted on opposite sides of the flue, and the light source beam is projected across the flue onto the photoelectric control. A sensitivity adjustment permits the equipment to be set so that it will signal when smoke density approaches whatever value is prescribed as maximum by the local municipal smoke ordinance. Supplementary equipment available includes bell alarms to signal excessive smoke, densimeters to give continuous indications of smoke density and recorders to record the time of day at which excessive smoke passes through the stack. Unit operates on 115 v, 60 cycle ac.

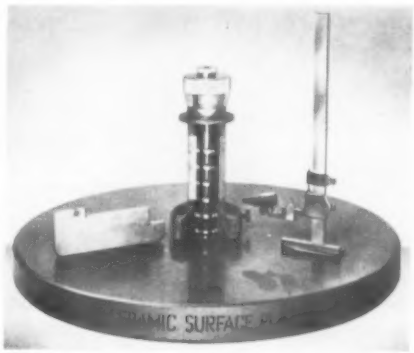
**Jolt Pin Lifter:** Milwaukee Foundry Equipment Co., 3236 West Pierce St., Milwaukee 4—Heavy-duty jolt pin lifter weighs more than 11 tons and is designed to eliminate squaring shafts, linkages and cranks. It is capable of handling a wide range of molding jobs and is said to have a solid, true jolting action and a precise controlled pattern draw. It can be worked with a slinger where ac-



curate, fast draw is necessary. Jolting capacity with an 18-in. jolt piston is 10,000 lb at 90 psi line pressure. It has a hydraulic strip with a capacity of 7000 lb. Table size is 54 x 85 in. with maximum pin width of 51 in. and minimum pin width of 38 in.

**Core Binder:** American Cyanamid Co., 30 Rockefeller Plaza, New York 20—Newly developed core binder is a thermosetting resin made under carefully controlled conditions and especially prepared as a water resistant foundry core binder. It is said to produce cores which withstand high humidity and long layovers in molds. It can be cured in either conventional or dielectric ovens and allows quick-cured cores for rush jobs. It is sold as a pure resin and may be modified with fillers and extenders to meet job requirements. It is said to produce cores with good collapsibility.

**Surface Plate:** Norton Co., 1 New Bond St., Worcester 6, Mass.—Ceramic surface plate is designed for use in toolrooms and inspection departments where precision setups and checking measurements require a high degree of accuracy. Plate is said to have good wear resistance, a precisely flat surface guaranteed to



be within 0.0001-in., and a continuously smooth surface finish. Made of a hard nonmagnetic substance the plate is said not to warp or deform, give expansion troubles, or deflect under load. Plate will not sweat or corrode under any atmospheric condition, and may be cleaned with soap powder and water.

**Motor Starter:** Trumbull Electric Mfg. Co., Plainville, Conn.—Magnetic motor starter and magnetic contactor is designed to give protection to alternating current motors up to 50 hp, 440 v. Two outstanding features of the new unit are the relay heaters and the plastic-encased coil. The bimetallic relay heaters are said to follow the heating curve of the motor. The relay adjusts easily for automatic or manual reset when a simple lever is moved. The plastic-encased coil protects windings from moisture, corrosion and abrasion. It has a permanent, self-lubricating compositon impregnated into the plastic that will keep the magnet guides sliding smoothly and at the same time eliminate low voltage chatter.

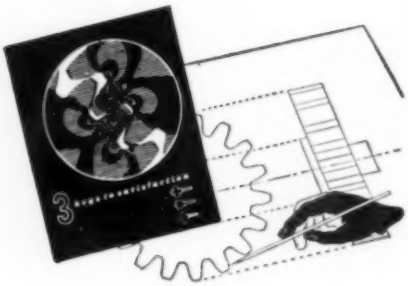
**Portable Mixer:** National Engineering Co., 608 Machinery Hall Bldg., Chicago 6—New portable sand mixer, known as the Porto-Muller, handles 250 to 300 lb of sand

and is powered by a 3-hp, 1800-rpm motor through V-belt drive. It is equipped with standard 6.00 x 16 in. implement type tires and wheels with sealed grease packed antifriction bearings. Spring adjustment preloads mullers within a range of 100 to 275 lb to provide correct muller weight for all types of sand.

**First Aid Cabinets:** Industrial Products Co., 2827 North Fourth St., Philadelphia 33—First aid cabinets of all steel are constructed to protect contents against dust, dirt and moisture. They are finished in white enamel and have clear glass doors so that contents may be seen at all times. They are sold as complete units containing first aid supplies and a first aid handbook. Two sizes are available—36 x 24 x 9 in. and 24 x 18 x 8 in.

**Ventilating Fan:** Acme Equipment Co., Muskogee, Okla.—Portable belt-driven propeller type ventilating fan is self-contained in an all-welded metal cabinet. It is equipped with front and rear expanded metal guards, casters, 6-ft rubber covered extension cord and approved plug. It is available in 14 sizes from 28 in. with 5200 cfm to 60 in. with 46,500 cfm.

**Gravity Conveyors:** Sage Equipment Co., 30 Essex St., Buffalo 13 — Gravity roller conveyors are made in 5 and 10-ft lengths and widths from 6 to 36 in. in increments of 2 in. Rollers are 2-in. in diam, 16 gage steel with special ball bearings on both ends. Roller axles are made of 7/16-in. hexagon steel and



# DESIGN
## as it affects metallurgy

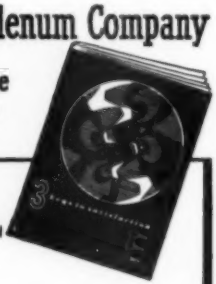
Production of efficient machine parts at low cost requires the correlation of three fundamental factors, Design, Material and Treatment.

To assist designers we have prepared a 100 pp book "Three Keys to Satisfaction" in which the bearing of each factor on production of machine parts is discussed. The conclusion is drawn that, of the three, Design is the most important factor.

Copies of this most useful book will be sent, on application, free to designers and engineers.

**Climax Molybdenum Company**

500 Fifth Avenue
New York City



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3 KEYS TO SATISFACTION

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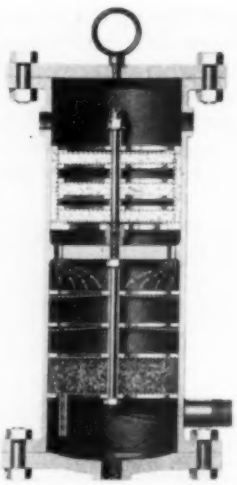
MOLY

F-5 F14

are set in hexagon holes in frames so that shaft or cone does not turn on the axle. Spring locks which hold axles in place are said to allow rollers to be removed from frame without the use of tools. Conveyor is available in straight and curved sections with simple connectors which are claimed to eliminate the necessity of tools for assembly.

**Air Cleaner:** James A. Murphy & Co., Fifth & Vine Sts., Hamilton, O.—Compressed air cleaner is manufactured in four sizes for ½, 1, 1½ and 2-in. pipe inlets. It meets safety requirements of state and federal governments and is fully guaranteed. Air enters the bottom chamber at a full tangent which imparts a whirling motion and separates the moisture through impact with the cylinder wall. The air then rises through a copper tangle and two fluttering, perforated baffles. Separated moisture descends to an automatic trap below the unit, where it is ejected as collected, and the dried air continues upward through three cotton felt discs which are designed to remove the last trace of moisture, oil and dirt. Cotton felts may be removed, cleaned with solvent and reused.



**Extension Cord Transformer:** Etraco Mfg. Co., Woods Church Rd., Flemington, N. J. — Portable safety transformer is designed to safeguard industrial workers in damp or wet locations from the possibility of fatal electric shock while working with the conventional type of 110 v extension trouble lamp. Unit weighs 4½ lb and reduces a 110 v circuit to 6 v. It is encased in a waterproof Bakelite casing tested to withstand physical and chemical abuse. When connected to an outlet, the unit can

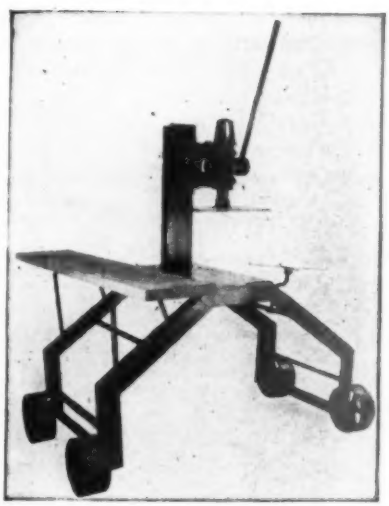
(*Continued on page* 280)

**"RAPID" MOLDING MACHINES**

★

*PORTABLE JOLT SQUEEZER R9X*

***WRITE for NEW BULLETIN "F"***



*PORTABLE HAND SQUEEZER R-10*

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*Molding Machine Manufacturer for Over 20 years*
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DETROIT ELECTRIC FURNACES which are lined with Taylor SILLIMANITE Brick and Special Shapes are setting new records for long, efficient operation and lower refractory costs per ton of metal poured. Lining life may be increased by intelligent patching with one of the Taylor SILLIMANITE Patches and Cements which have been "engineered" for this job.

*Linings for furnaces with conical shells are fitted to gauge. Assembled and match marked before shipment, Taylor-made Linings may be installed with minimum delay.*

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# SEMET-SOLVAY FOUNDRY COKE

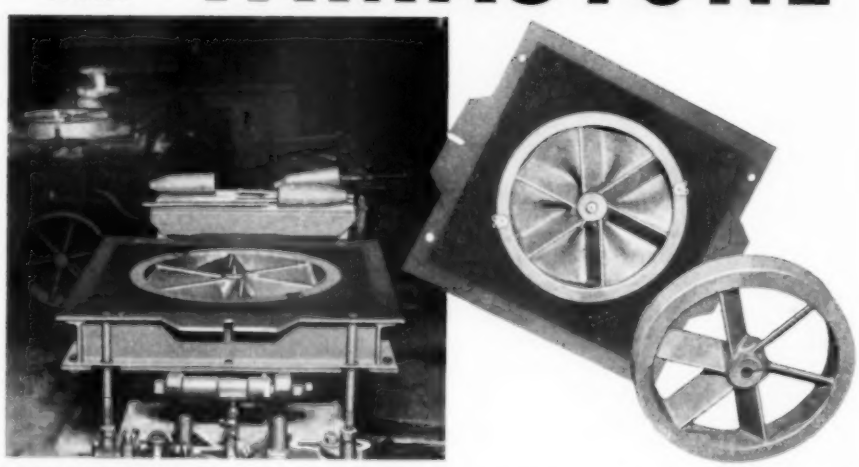
**Do you *know?*** When the wind is on and you see the first iron trickling past the peep hole, do you *know* your castings are going to have the strength, Brinell and composition you're shooting for? The users of Semet-Solvay Foundry Coke no longer worry about that problem. They are *sure* of results.

**SEMET-SOLVAY DIVISION**
Allied Chemical & Dye Corporation
CINCINNATI · DETROIT · BUFFALO
*In Canada:* SEMET-SOLVAY COMPANY, LTD., TORONTO

*for Better Melting*



# 4 YEARS-OVER 36,000 MOLDS with TAMASTONE



## TAMASTONE cope and drag patterns show big profits

Osborn Machine Company, DuBois Pa., says, "We feel that TAMASTONE has saved us a considerable amount of money" . . . "we have made 29,000 of the larger wheels . . . 36,000 of the smaller size wheels."

All users report savings . . . some increase production 400% others 600% and up! TAMASTONE cope and drag patterns or match plates can be made in your foundry by your own molder. No special accelerators, retarders, vehicles and no *special experience needed!*

How about giving TAMASTONE a trial . . . bet you save money too!

**TAMMS SILICA CO., 228 N. La Salle St., Chicago 1, Ill.**


(*Continued from page* 278)

be left on the floor or table or it can be hung from any wall fixture by a hook which protrudes from the top of the transformer. A larger model designed to reduce a 220-v lighting circuit to 32 v also is in production.

**Rotating Forks:** Mercury Mfg. Co., 4036 South Halsted St., Chicago 9—Rotating fork attachment for the company's 2 and 3 ton

fork trucks is said to provide 180 degree rotation of forks to either right or left. Mechanism is powered from the truck's hydraulic pressure system through flexible pressure lines and electric limit switches. Rotation is accomplished by a double acting hydraulic cylinder and ram assembly with spur gear drive to the ball bearing mounted turntable on which the carriage revolves. Rotation is controlled by a lever adjacent to the hoist and tilt handles on the dash.

**Hydraulic Vise:** Columbian Vise & Mfg. Co., 9017 Bessemer Rd., Cleveland 4—Oil hydraulic, swivel type vise is foot operated and has $3\frac{1}{2}$-in. jaw width and 6-in. jaw opening. It is equipped with two foot

control pedals—one power, the other release. Power pedal provides a slow, short movement of the front jaw; eight strokes are needed for closing from full open position. Maximum

(*Continued on page* 282)

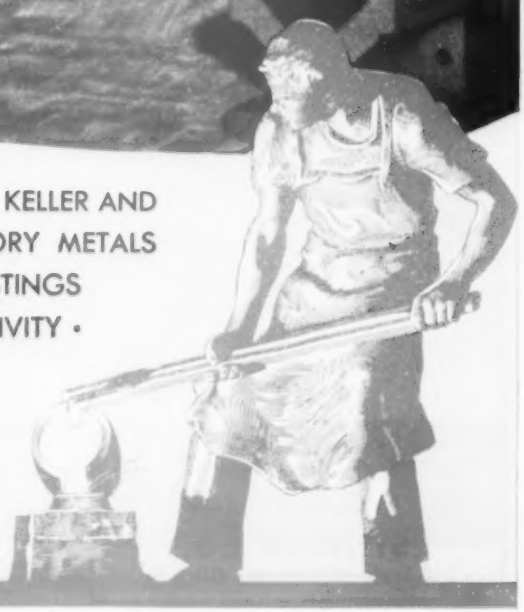
PETER VISCHER
*The Craftsman*
St. Sebald's Church
Nürnberg

# An Heritage of skill in a craft

Peter Vischer, the great bronze founder, was a Fifteenth Century Guild Master and responsible for some of the most artistic castings that are today looked upon as examples of all time expert design and workmanship.

As a boy Peter worked as an apprentice with his father. In those days every youth destined for a certain trade had to be apprenticed to a Master who was responsible for his education.

This tradition has been carried on through the centuries—and today in our own plant we have many sons working along side of their experienced fathers. As an example, here is an illustration of Master Craftsman Ben Szymanski and his well-taught and equally accomplished son George B. Szymanski.



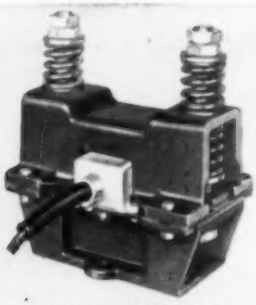
PERMANENT MOLDS • WOOD AND METAL PATTERNS • KELLER AND DUPLICATOR WORK • MACHINE WORK • MALLORY METALS BERYLLIUM COPPER • MONEL METAL • EVERDUR CASTINGS COPPER CASTINGS OF HIGHEST ELECTRICAL CONDUCTIVITY • BRASS, BRONZE AND ALUMINUM CASTINGS

**CITY PATTERN**
FOUNDRY AND MACHINE CO.

**1161 HARPER AT RIVARD • DETROIT 11, MICHIGAN**

SYNTRON

**Speeds Up Bulk Material Handling —at Reduced Costs!**



**BIN VIBRATORS**
Make Stubborn Materials Flow Freely

**VIBRATORY FEEDERS**
Up to Hundreds of Tons per Hour — Rheostat Control of Flow

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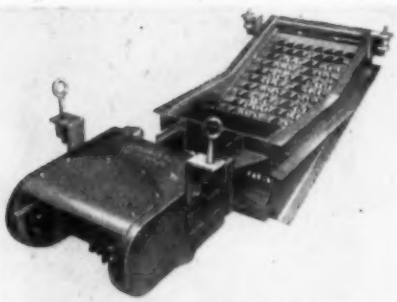
Both Feed and Scalp With One Unit



**VIBRATING SCREENS**
Wet or Dry — Single or Multiple Decks

**PLUS—**
Long Conveyors
Batching Systems
Hopper Level Switches

*Write for literature*

**SYNTRON CO.**
540 Lexington, Homer City, Pa.

(*Continued from page* 280)

holding pressure is 6000 psi. Vise is protected by a safety relief valve to prevent overloading the hydraulic system and the vise. Vise castings are malleable iron and replaceable jaw faces are hardened tool steel. Opening and closing can be controlled at any point, opening being accomplished by pressure of a coil spring. For production work, an adjustable stop can be set at any point within the full range of jaw opening to hold a series of pieces of the same size and shape.

**Lifting Magnet:** Ohio Electric Mfg. Co., 5900 Maurice Ave., Clevleand 4 — Lightweight lifting magnet was developed for use with

mobile cranes in an effort to reduce dead weight load. It is said to weigh approximately 20 per cent less than heavy duty types and is available in 39 or 45-in. diam. Both sizes are designed with the weld on top of the magnet, to minimize danger of damage.

**Glove:** American Optical Co., Southbridge, Mass. — Heavy-duty cowhide glove has canvas back with

elastic strap to overcome hand fatigue while providing a cooler feeling and snug fit. Seams are steel sewed where necessary and the seam

(*Continued on page* 284)

**USE**

**SCIENTIFIC MATCH PLATES**
*Pressure Cast*

**SHARP PARTINGS**
•
**ACCURATE PATTERN DUPLICATION**
•
**LOWER COSTS**

*The*
**SCIENTIFIC**
CAST PRODUCTS
*Corp.*

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# UNITED STATES ELECTRICAL TOOLS

## FOR LOWEST COSTS IN FOUNDRIES LARGE OR SMALL

**PROVED QUALITY**

**PROVED ECONOMY**

**PROVED PERFORMANCE**

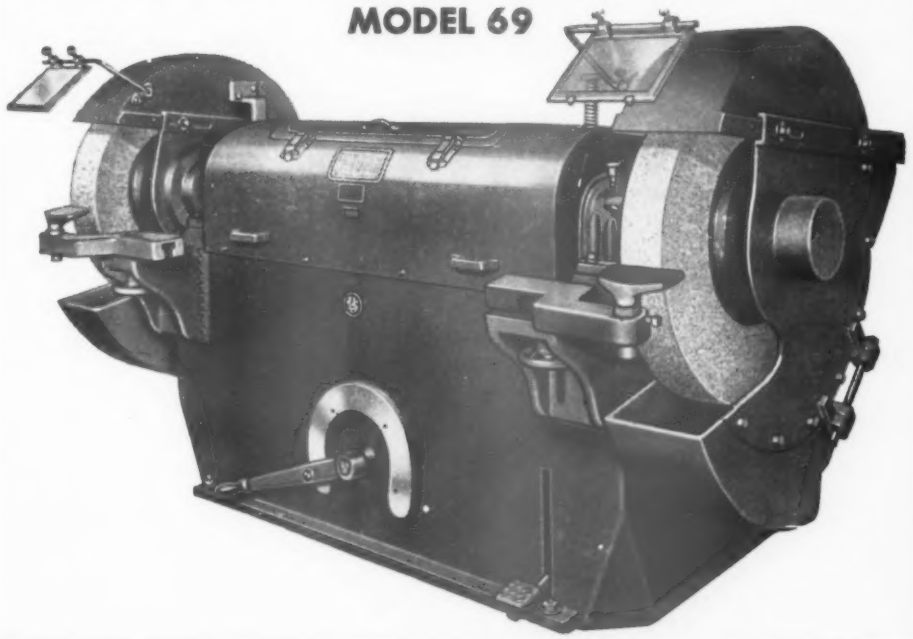
America's most complete line of electrical tools is precision-designed and precision-produced for positive performance speedily and efficiently. You are assured of maximum savings in time, labor and costs.

## ADJUSTABLE SPEED SNAGGING GRINDER

For heaviest type production grinding where more power is required than on the average production job. Equipped with semi-enclosed, constantly lubricated four-speed drive transmission enabling operator to maintain efficient peripheral speed for the full life of the wheel. The speed lever is interlocked with guards which makes it impossible to increase speed unless wheels are worn down sufficiently to justify speed change. Electric interlock prevents operation of machine unless gears are in mesh.

**FOUR SPEED CHANGES . . . . . WHEEL GUARDS ADJUSTABLE TO WHEEL WEAR . . . FOR VITRIFIED OR HIGH SPEED WHEELS**

**MODEL 69**



***IN STOCK AT YOUR JOBBER***

- Drills
- Grinders
- Surfacers
- Polishers
- Sanders
- Tappers
- Hole Saws
- Buffers
- Flexible Shaft machines and many other tools

**The UNITED STATES ELECTRICAL TOOL Co.**

CINCINNATI, OHIO

# INDIVIDUAL JOB COSTS

**Does your present Cost System enable you to figure INDIVIDUAL JOB COSTS, thus insuring a profit on every casting handled in your foundry—or—are you relying on antiquated methods of costing which can supply only an overall picture of your average casting costs?**

**If yours is the latter method, you are OVERESTIMATING ON PROFITABLE WORK causing its placement elsewhere, and UNDERESTIMATING ON UNPROFITABLE WORK, getting it, and consequently suffering a loss.**

**Why not inquire about our system which will permit you to PREDETERMINE COSTS and hence GUARANTEE PROFITS.**

COST CONTROL
WESTOVER ENGINEERS

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FOUNDRY MANAGEMENT CONSULTANTS
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TRADE **EY-BARS** MARK

**BEST FOR STEEL**

STANDARD SIZES

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| 2-lb. | 8-lb. |
| 3-lb. | 10-lb. |
| 5-lb. | 12-lb. |

Also Special Sizes to Order

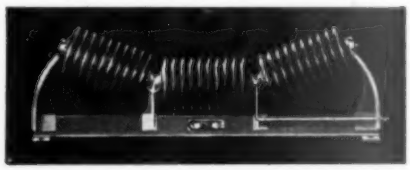
*Made Only by*

THE CLEVELAND ELECTRO METALS CO.
CLEVELAND 13, OHIO
Member Aluminum Research Institute


(*Continued from page* 282)

along the forefinger has been eliminated. Wearing surface of the palm has been increased and a steel-stapled strap at the thumb crotch and a steel-stapled patch on the face of the thumb reinforce that part of the glove. The glove has a short cuff with tape binding.

**Idlers:** Continental Gin Co., Industrial Division, 4600 Tenth Ave., Birmingham 2—Rubber disk impact idlers are made for troughed, flat and



return belts, and are said to be interchangeable with practically all standard idlers. They are designed to reduce damage to the cover and carcass of the belt under loading points. Company also offers hollow center rubber-tired impact idlers for heavier installations as well as special impact idlers to meet specific conditions. All idlers are equipped with antifriction bearings.

**Goggle:** Chicago Eye Shield Co., 2336 Warren Blvd., Chicago 12—Redesigned spectacle type goggle incorporates broad bearing jumbo bridge pads plus balanced suspension of the frame to distribute the light

weight of the goggle evenly across the nose. The bridge pads also are said to seal the entire eye area to prevent entrance of foreign particles. Goggles are available with three bridge widths and three lens sizes to provide correct fit for various facial contours. They can be equipped with or without side shields and with antiglare lenses.

**Core Baker:** Induction Heating Corp., 181 Wythe Ave., Brooklyn 11, N. Y.—Electronic core baking tunnel has a capacity of from 1500 to 2000 lb of sand per hour, depending upon moisture content. Cores up to 12 in. high (including core and core

(*Continued on page* 286)

# God bless you, mister

## *. . . thousands of Cancer patients are grateful to you!*

*Cancer's annual toll of 200,000 lives is grim proof of the need for your continued generosity. The money you contribute to the American Cancer Society helps pay for the development of methods of treatment which are now saving about one-quarter of the people who are stricken with Cancer . . . people who might otherwise have died. Your money supports the work of more than a thousand specialists who are fighting to find the cause and cure of Cancer. And it finances a vast education program that trains professional groups, tells the public how to recognize Cancer and what to do about it.*

*Your life—the life of everyone you know—is at stake. Your investment can mean health and happiness to millions. Thank you . . . and God Bless You, Mister.*

***just mail it to***

# CANCER

**Just write "CANCER" on the envelope containing your contribution. It will be delivered to the American Cancer Society office in your state.**

# New Form FOSECO DEGASERS

*are*

MORE EFFICIENT . .
MORE ECONOMICAL

***and* HERE'S WHY!**

●

***TABLET FORM ALUMINUM DEGASER NO. 190 IS A TIME SAVER & MONEY SAVER***

Aluminum and its alloys are degassed and grain refined in one simple operation. No extra equipment necessary! Foseco Tablet Form Degaser No. 190 is safe . . reliable . . degasses, eliminates pinholes, and reduces rejections.

***COPPER & NICKEL BASED ALLOYS ARE TROUBLE-FREE WHEN DEGASED WITH FOSECO CUPREX BLOCKS!***

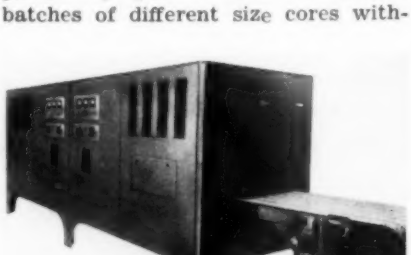
Use the scientifically sound and universally accepted oxidation-reduction technique for degassing Brasses, Bronzes, Nickel Silver, and other copper and nickel based alloys. Foseco Cuprex Blocks make pressure-tight castings and increase physical properties.

***Solve your degassing problem now! Write to***

**FOUNDRY SERVICES INC.**
280 Madison Avenue New York 16, N.Y.

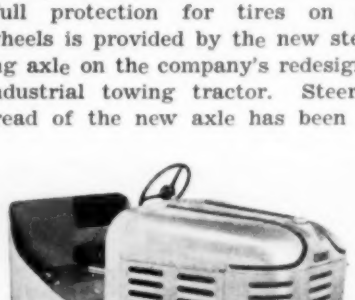

(*Continued from page* 284)

plate or drier) and 30 in. wide are accommodated. Cores are loaded directly on the conveyor which carries them at a predetermined rate between two heating electrodes. Distance between the electrodes is adjusted by push button to handle batches of different size cores with-



in the prescribed range. Burning of cores is claimed to be eliminated because the electronic heating method results in uniform temperature rise throughout the mass of the core, regardless of irregularity in shape or dimensions, and also automatic temperature control is provided. Input rating of the unit is 70 kva at full load, 90 per cent power factor, 410/490 v, 3-phase, 60 cycle. It is a continuous conveyor type, self-contained unit 22 ft long, 5 ft wide, 6 ft 8 in. high, weighing approximately 4 tons.

**Tractor:** Clark Equipment Co., Industrial Truck Division, 258 Champion St., Battle Creek, Mich.—Full protection for tires on the wheels is provided by the new steering axle on the company's redesigned industrial towing tractor. Steering tread of the new axle has been re-



duced from 27 in. to 22 5/16-in., which permits the wheels to be turned to their extreme position within the body of the machine. Wheel wells around the tires have been reduced in dimension to provide further tire protection. On the new axle the steering tie rods have been raised and a heavy steel plate 6-in. wide is mounted beneath the axle to protect the steering mechanism. The removable plate is bolted to the axle

(*Continued on page* 288)

**FROM SCRAP CORE RODS**

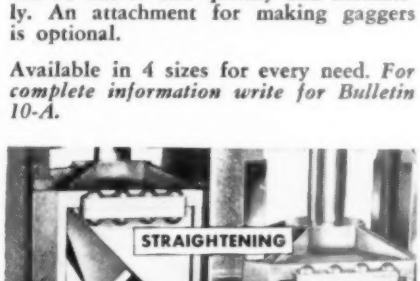
***. . . and Form Gaggers, too***

If core rod costs are a problem because of costly hand straightening or excessive purchases of new stock, the Core Rod Straightener will return you a nice profit.

A Chicago foundry, for example, saved 50% on the purchase of new materials and by replacing costly hand-straightening saved over 2,000 hours yearly. In shops where the machine is used the scrap pile is a thing of the past . . . labor and material costs go down . . . and the savings are sufficient to quickly return the investment.

No specialized talent is needed to operate the machine. Anyone can do it after a few simple instructions. It operates as fast as material can be fed into it. Rods can be cut to size quickly and accurately. An attachment for making gaggers is optional.

Available in 4 sizes for every need. *For complete information write for Bulletin 10-A.*



American CORE ROD STRAIGHTENER

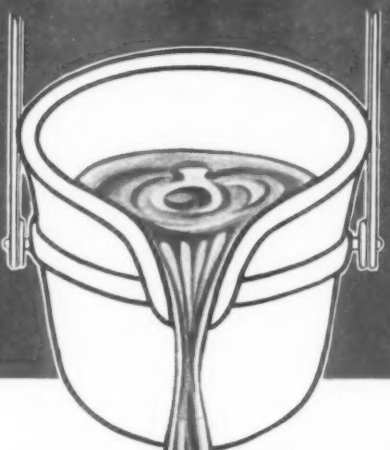
AMERICAN WHEELABRATOR & EQUIPMENT CORP
505 S. Byrkit St. Mishawaka 2, Indiana

Our Own Source of Coal

Our Own Source of Ore

Our Own Coking Plant

Our Own Control of Operations



# WOODWARD PIG IRON

America's largest completely independent and entirely integrated merchant iron producer.

## WOODWARD IRON COMPANY

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*Independent Since 1883*

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# SURVIVAL
## of the individual foundry

will depend on the effectiveness of its organization, methods, price control and engineering facilities. The foundry business is marching forward—but the conditions that governed it during the war years no longer exist. Competition in the new era will be keen, and the individual foundry that is weakly organized is the most likely to falter. We offer a coordinated consulting, supervisory and engineering service to modernize your foundry. The service is designed for large or small foundries.

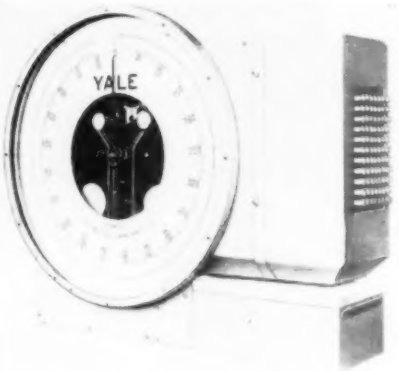
CONSULTING ★ SUPERVISORY ★ ENGINEERING ★

W. G. REICHERT ENGINEERING CO.
1060 BROAD ST., NEWARK 2, N. J.

(*Continued from page* 286)

support back of the axle and to the tractor body in front. A universal joint incorporated in the steering mechansm is said to help eliminate wheel kickback.

**Weight Printer:** Yale & Towne Mfg. Co., Philadelphia Division, 4530 Tacony St., Philadelphia 24—Weight printer offered as an integral part of the company's indus-




trial scales prints actual weights in numerals 9/32-in. high, without additional printing or mental calculation. Various weights in a series can be identified by printing opposite the recorded weight from one to eight symbols, numerals or letters. Unit will record weights on tickets from 3 x 5 in. to 8½ x 11 in. or on a tape or on a combination of tickets and tape. The standard printer operates on 100 v, 60 cycle, single phase alternating current. It can be furnished to operate on other currents at special request.

**Sand Washer:** Precision Scientific Co., 3737 West Cortland St., Chicago 47—Sand washer was developed for determining the clay content of molding sands in accordance

with the procedure recommended by the committee on foundry sand research of the American Foundrymen's Society. Unit consists of a

(*Concluded on page* 290)

# Brief Notes for Busy Foundrymen

## What do they DO . . ?

**Volclay** (a Western bentonite) is added to foundry sands to furnish green dry, and hot strengths. Only 5% by weight addition is required with 95% unbonded sand to furnish correct molding properties. **Volclay** gives excellent dry and hot strengths, which overcome cuts, washes, and other defects common to weak sands subjected to heat.

**Panther Creek** (a Southern bentonite) requires about the same addition as when Volclay is used, yet the dry and hot strengths are *much lower*. There is a moving trend toward the use of Panther Creek as a bond, since it enables *greater production* through its increased flowability and easy ramming characteristics. **Panther Creek** helps to overcome cracks, hot tears, and other defects common to high hot strength.

**Five Star Wood Flour** is rapidly taking its place as a foundry material. More foundrymen are finding that a 1/4%-2% addition by weight offers better sand mixtures. It furnishes better casting peel, less sand loss from over-baking, a reducing atmosphere and improves ramming and *overcomes sand expansion*, thus relieving scab, buckle, and rat-tail defects. Its presence insures satisfactory deformations, removing the constant fear of *too hard ramming* in sections of the mold. Density affects sand expansion and sand contraction, and **Five Star Wood Flour** controls density to the discretion of the technician.

**KNOW your products and less Molding and Casting Difficulties will arise!**

**VOLCLAY Western Bentonite • FIVE STAR Wood Flour • PANTHER CREEK Southern Bentonite •**

**AMERICAN COLLOID COMPANY Chicago Illinois • Producers Since 1927**

**Available from Leading Foundry Suppliers in the United States and Canada**

(*Concluded from page* 288)

stand for holding six 1-liter capacity beakers, a circular base supporting the stand, an electrically operated impeller, and a siphon. The stand can be turned on the base so as to make all beakers accessible from any position. Stirring motor is attached to a bracket which can be raised or lowered in the central post of the stand. Sand particles set in motion by the stirring blade impinge on six vertical baffles located around the wall of the beaker. The siphon for removing the wash water from the beakers can be mounted at the end of each arm on the stand. To aid in obtaining the correct water levels in the beakers, two pointers are provided for each beaker on the stand; lower pointers indicate the height of 500 cc of water, and the upper pointers indicate a height of 6 in. from bottom of the beakers.

**Electric Sander:** Sterling Tool Products Co., 1340 North Milwaukee Ave., Chicago 22—Portable electric sander weighs 4¾ lb and features a nonstalling, high-speed motor encased in a die cast aluminum alloy housing. It uses standard size abrasive sheets cut in thirds, and four or five sheets can be loaded on the pad at one time. It operates on the "orbital motion" sanding action principle and is said to produce fine uniform sanding results even on parallel boards with opposing grain structures without risk of grit scars. Sander operates on ac or dc and measures 9 in. long, 3 in. wide and 4 in. high.

**Hand Trucks:** Moto-Truc Co., 1953 East 59th St., Cleveland—A new and more powerful motor unit is being featured by the company on its motorized hand truck equipment. Features of the new unit are ball bearing motor, larger armature and field coils, high starting torque, lower draw on battery, and easy accessibility to all operating parts. Interchangeable motor feature permits replacing motors in 15 to 30 minutes.

*A Little Does a Lot*

**GCC CERIUM METAL (Mischmetal)** added in small quantities to many Ferrous and Non - Ferrous Metals improves the metallurgical and mechanical properties of the end products.

***Discover how a little does a lot by writing for our informative bulletins.***

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EDGEWATER, NEW JERSEY

S STANDS FOR *Sterling* AND *Satisfaction!*

**The "S" stamped on the back of every Sterling Wheelbarrow symbolizes Sterling quality and satisfaction in barrow transportation. It is our way of letting you know that Sterlings are built from the finest materials by skilled craftsmen.**

**STERLING WHEELBARROW CO., MILWAUKEE 14, WIS.**

**Welded tray, all-steel construction with reinforced tubular steel frame, channel steel legs and roller bearing wheel with pneumatic tire. Assures smooth wheeling and perfect balance.**

*Sterling* WHEELBARROWS

A 5479-½

West's Culture Assailed
As Soviet Schools Open
LONDON, Sept. 1—A new school year began in Russia today and Pravda, the Communist party newspaper, exhorted teachers to fill their students with "profound contempt for bowing and scraping before the bourgeois culture of the West."

# Dear Soviet Teachers:

We note that you have been discreetly silent on some aspects of the Communist system. And that you have been urged by Pravda to fill your students with "profound contempt" for the admiration given to ours.

May we respectfully suggest a few more things that you'd better keep quiet about if you want the young Russians to grow up convinced Communists.

Don't tell them that in America the opportunity for advancement is unlimited—that here a man can work where he pleases and change his job when he pleases, and that he has the right to organize and bargain collectively.

Don't say anything about the competitive system, with rewards for initiative and enterprise in free markets—the same system which has produced a standard of living about ten times higher than yours.

Don't mention that here people can own things and manage their own businesses . . . and invest money in new undertakings.

Don't breathe a word about the American urge to invent better machines—and more productive ways to use them.

Don't refer to a dynamic way of life that keeps on turning out more and better goods—keeps on lowering costs and raising wages, with shorter working hours.

In other words, don't give them any of the facts about what happens when free people, governing themselves and spurred by ambition, go all-out to build a new kind of country—different from any the world has ever seen.

**We don't say our way is perfect—far from it. We still have our ups and downs of prices and jobs. But we *know* what's wrong and we're free to *do* something about it. Change is our middle name. *And in the long run, our system always changes for the better.***

P.S. About that "priority of inventions," the point isn't whether the Russian scientist Lodygin invented electric light before Edison, but what happened *after* it was invented. Which system—yours or ours—has mass-produced for more people the daily benefits of such inventions as the automobile, telephone, radio, refrigeration, central heating, modern plumbing and better farm machinery? The world knows that it is *our* system!

John Q. Public, U. S. A.

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—How a still better living can be had for all

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# Plastic PATTERNS NOW

Our specially developed techniques and practices now make plastic patterns practical and a reality for production use. Numerous foundries, who have been using these low-cost pattern plates for some time, find them definitely superior. Our plastics are adaptable for duplication of single shrink patterns, duplication of broken aluminum patterns, master patterns, cope and drag sections and core boxes.

Let us make a "PLASTIPLATE" pattern for you. A trial will convince you of the advantages. Write for Bulletin "F" or phone for complete information.

LOOK FOR THE NAME

**"PLASTIPLATE"**

TO IDENTIFY PLASTIC PATTERNS OF OUR DESIGN

REPRESENTATIVES IN FOLLOWING CITIES:

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ATLAS PLASTIC & ALUMINUM PRESSURE PLATE CO.
4813 North 124th Street
Butler, Wisconsin

**PLASTIC CORPORATION OF CHICAGO**

2444 South Central Ave., Cicero 50, Ill.
Phone: LAwndale 1-2661


# ...TRADE PUBLICATIONS...

MOLDING MACHINES: Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35 — Catalog covers company's complete line of foundry molding machines, including detailed specifications, drawings and photographs. New descriptive material on shockless molding machines is supplied in the catalog. Other printed material on the company's line of abrasive cutoff machines is also available in leaflet form.

VENTILATING FANS: Chelsea Fan & Blower Co., 1206 Grove St., Irvington, N. J.—Catalogs 863 and 864 contain descriptive copy, specifications, dimensions and photographs of a full line of fans for residential, commercial and industrial uses. These catalogs include information on 17 types of ventilating and comfort cooling equipment varying in size from 12 to 60 in., and in output from 1000 cfm. to 32,000 cfm.

SPEED CHANGERS: Allis-Chalmers Mfg. Co., South 70th St., Milwaukee— Bulletin 20B-6013-C on the company's speed changers deals with operating advantages, inspection and maintenance, and portrays typical installations. Included are data on speed range, a selection table of recommended unit size for standard motors, general dimensions of pilot motor arrangements and arrangement diagrams.

FLOOR CHAIN CONVEYOR: Jervis B. Webb Co., 8951 Alpine Ave., Detroit 4— Folder describes a chain conveyor running below the floor. Ordinary shop trucks equipped with a vertical pin are used as transporting units. When the pin is dropped into a slot in the floor, it is engaged by pusher dogs on the chain, and the truck is moved about a circuit. Trucks may be wheeled off the conveyor anywhere for loading or unloading.

ABRASIVE POINTS: Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37 — Illustrated folder ESA-67 discusses the versatility of mounted wheels and points for offhand and precision work and for grinding in hard-to-reach places. It contains full size illustrations of the products and suggested uses along with information on grains, grades and operating speeds.

STEEL MESH: Joseph T. Ryerson & Son Inc., Box 8000-A, Chicago 80— Bulletin gives engineering data, including load deflection, airflow comparison, and free openings, of both standard and flattened mesh types of expanded steel. Also included is a list of sizes with dimensions and weights, illustrations of mesh and typical applications, and data on expanded metal grating.

ALLOYS: Cerro DePasco Copper Corp., 40 Wall St., New York 5 —A new style and format for literature dealing with uses of the company's alloys has been inaugurated. Copies of the first four of these items, available now, are entitled: "Standard Cerro-Alloy Physical Data," "Cerro-Alloy Casting Procedure." "How To Make Chuck Jaws" and "Bending Thin Walled Tubing, Moldings and Extruded Shapes." A special data sheet binder is offered.

PROTECTIVE COATING: Dampney Co. of America, 1243 River Rd., Hyde Park, Boston 36—Bulletin 1540 describes an industrial protective coating for application to drinking and other water storage tanks, refrigerant condensers, various types of air conditioning equipment and in the marine field. Service data and application instructions are included.

LABORATORY FURNACE: Cooley Electric Mfg. Corp., 38 South Shelby St., Indianapolis—Bulletin 48A illustrates and describes a new electric laboratory furnace designed for experimental testing, enameling, fusing, igniting, precipitate drying and ashing in physical and chemical laboratories, and as a pilot furnace in metallurgical laboratories.

AIR CONDITIONERS: Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Division, 401 Worthington Ave., Harrison, N. J.—Bulletin C-1100-B33 contains descriptive literature and specifications on commercial and industrial air conditioning units. Tables present dimensions of the units and data on the various conditioner parts.

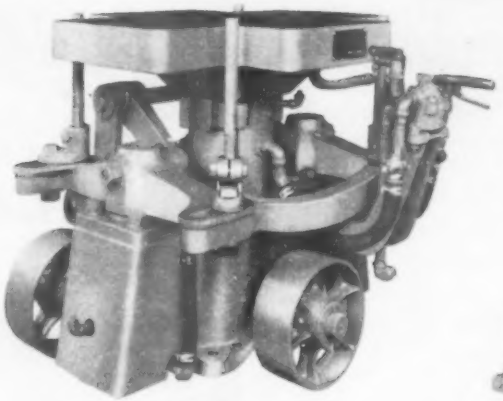
PRODUCTS LISTING: American Chain & Cable Co., 929 Connecticut Ave., Bridgeport 2, Conn.—Booklet DH-509 lists principal products manufactured by the company's thirteen divisions and seven associate companies. A list of sales offices, an alphabetical products index and a summary of each divisional listing are included.

LATHES: South Bend Lathe Works, 299 East Madison St., South Bend 22, Ind.—Illustrated catalog 100-G describes all lathes, major lathe attachments and accessories as well as the precision drill press manufactured by the company. Drawings showing required floor space for the various lathes are included.

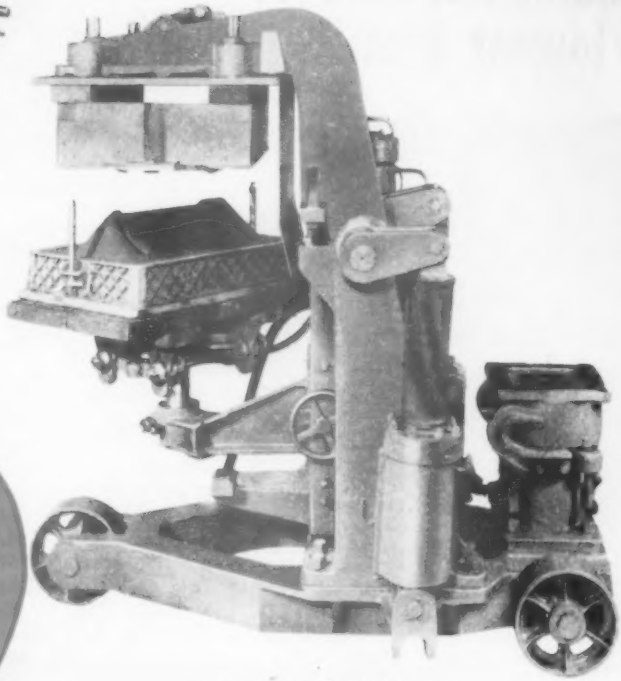
LOCOMOTIVE CRANE: American Hoist & Derrick Co., 63 South Robert St., St. Paul 1—Catalog 600-L-5, dealing with the company's 25-ton diesel locomotive crane, illustrates the crane in action in magnet, bucket, hook and pulpwood work. Photographs of the important mechanical features are included.

AIR DEVICES: Bellows Co., 222 West Market St., Akron, O.—Illustrated bulletin CL-15 gives a brief description of the products in the

(*Concluded on page* 294)



No. 681-C
Portable Jolt Stripper



No. 612 Portable
Jolt Roll-Over Pattern Draw

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## A COMPLETE LINE PROVEN IN SERVICE INCLUDING—

**PLAIN AIR JOLTS**
in 12 different sizes

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fast sturdy machines—3 sizes

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4 sizes ranging up to 16" draw

**JOLT, SQUEEZE, STRIPPING PLATE AND PATTERN DRAWS**
Popular for medium service —2 sizes

**PORTABLE JOLT ROLL-OVER AND PATTERN DRAW**
A heavy duty thoroughly dependable machine—portable

**JOLT ROLL-OVER AND PATTERN DRAWS**
Fast large capacity machines with roll-out conveyors—4 sizes

*Write for fully descriptive catalog giving complete specifications.*

● Speed up your production and keep competitive with Johnston & Jennings molding machines. The No. 681-C jolt stripper pictured above—furnished portable or stationary—features a valve-less, shock-less, jolt free from rebound, a positive draw, speed of which is variable to meet different conditions,—and complete enclosure of all working parts, thus assuring years of efficient trouble-free service.

The No. 612 Portable Jolt Roll-Over is designed specially for work requiring absolute accuracy in ramming and drawing. It is ideally used for making the intricate cores and molds required in aircraft and other precision industries. Use of two roll-over cylinders and oil dash pot control assures smooth uniform operation. "J & J" has just the machine you need.

*Meet us in St. Louis May 2-5 1949*

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867 Addison Road • Cleveland 14, Ohio

*IMPROVED UP-TO-THE-MINUTE MOLDING MACHINES FOR EVERY NEED*

# Sahara Belt handles hot sand... at lowest cost

■ One of the largest Pennsylvania steel foundries recently installed 135′ of 8-ply, 30″ Standard SAHARA belting on this conveyor handling hot foundry sand after shakeout. Because Imperial's SAHARA is specifically designed for continuous service under high heat conditions, it has been used by foundries for over 25 years.

**Made for High Heat Service**

SAHARA belting is made of tight woven, 37½ ounce, silver duck with a tensile strength exceeding 700 lbs. per inch of width. Fibers are impregnated with special heat-resisting compounds, the result of Imperial's 40 years' belt manufacturing experience. Exclusive Imperial double-stitched, Inner-Locked construction positively prevents ply separation.

Standard SAHARA Belting is recommended for continuous service to 300°; *Insulated* SAHARA from 300° to 450°; *Super Insulated* SAHARA from 450° to 600°.

***Write for Data Sheets—and prices.***

**IMPERIAL BELTING CO.**

1755 S. Kilbourn Ave., Chicago 23, Ill.

**Imperial**
**INNER-LOCKED**
**BELTING**
*Engineered Belting—*
*The Right Belt for Each Job*


(*Concluded from page* 292)

company's line of pneumatic devices, including air-powered feeds, air-powered vises, air collet chucks, rotary feed tables, air-powered presses, air motors, air cylinders and air valves.

TRUCKS: Crescent Truck Co., P. O. Box 538 Lebanon, Pa.—Bulletin illustrates 20 different models of electric industrial trucks and tractors. It includes a questionnaire for determining the correct type and model of truck to use under various operating conditions.

ELECTRODE: Eutectic Welding Alloys Corp., 40 Worth St., New York 13—November-December issue of the company house organ is devoted to the development of a new electrode for use in the field of cold cast iron arc welding. Case history illustrations and operational data are included.

FURNACES: Surface Combustion Corp., 2375 Dorr St., Toledo, O.—Folder SC-141 summarizes the company's line of industrial furnaces. Equipment for a broad range of processes is presented, including hardening, tempering, forging, metal melting, and air heating.

VACUUM CLEANERS: Breuer Electric Mfg. Co., 5100 Ravenswood Ave., Chicago 40—Folder contains specifications of the various models of industrial vacuum cleaners manufactured by the company. Possible uses in an industrial plant are discussed.

MAGNETIC PULLEYS: Stearns Magnetic Mfg. Co., 662 South 28th St., Milwaukee 4—Bulletin 350 describes a new line of permanent magnetic pulleys. It contains features, illustrations, specifications, dimensions, capacities and typical applications.

MONORAILS: Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.—New series of catalogs on overhead crane and monorail systems cover general use and economy, fittings, carriers, electrification, assemblies, motor drives and cranes.

SPACE HEATER: Dravo Corp., Heating Section, Dravo Bldg., Pittsburgh 22—Bulletin 523 describes forced air space heaters available in output capacities from 400,000 to 2 million Btu per hour and fired by oil or gas.

BROCHURE: Belle City Malleable Iron Co., Racine Steel Castings Co. Division, 1442 Forest St., Racine, Wis.—Folder 7 presents a number of views of various departments in the company's recently mechanized malleable iron foundry.

FILTER PAPERS: Carl Schleicher & Schuell Co., 116 West 14th St., New York 11—Catalog 70 describes, classifies and discusses the selection of filter papers for use in chemical analyses and biological procedures. Reference tables are included.

THERMOMETER: W. C. Dillon & Co., 5410 West Harrison St., Chicago 44—Bulletin describes and illustrates the company's stainless steel thermometer, giving full details of the various sizes and models offered.


**ONLY A**
**Stripper**
**(PATENTED)**
**MECHANICAL**
**FLASK**
**OFFERS A**

# NON-TIP COPE

**AT LAST...** a cope that can be set on its side without tipping or rocking! It's just one of many *exclusive* STRIPPER features that are saving time and money in America's leading foundries.

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STRIPPER flasks and jackets can be supplied promptly in either 4° or 5° taper, to any dimensions. Special shapes are available on order.

**• THE FACTS are yours for the asking. Ask your local supply house, or write today for literature... or for prices and delivery information on your particular requirements.**

*General Foundry Service Corporation*
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# BUCKEYE "3-in-1" FLASK GUIDES *Again Improved!*

**NOW** — Four New Features for more assurance of Perfect Lifts!

BUCKEYE "3-IN-1" Flask Guides, featuring the exclusive 3-V pins, slides and match plate lugs (all interchangeable), have again been improved in four ways!

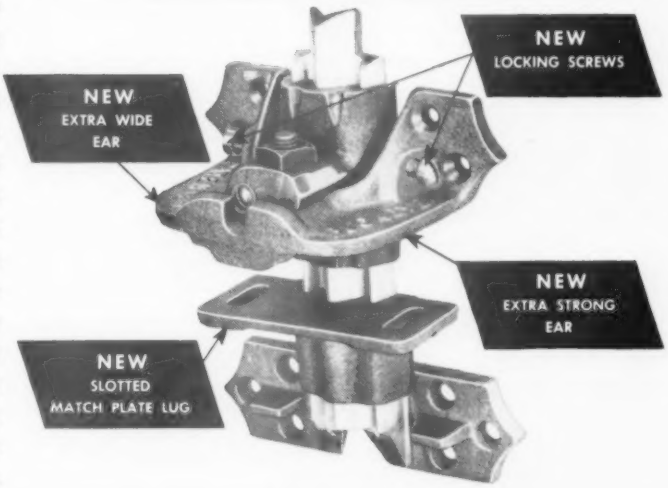
1. Two *new* Locking Screws, one at each side of the ear, hold slide more firmly against pin—give a 3-point locking arrangement — assure perfect and permanent alignment.

2. The *new* extra strong Ear affords maximum strength to withstand jolting and squeezing operations without cracking or straining.

3. Increased width of the *new* Ear provides molder a better grip—easier lifting of the cope! *New* Ears can replace old-style Buckeye ears without alteration.

4. *New* Match Plate Lugs come to you slotted for easier, faster attachment to the match plate, and correct adjustment to the pin.

These new features mean a better, more rigid flask guide assembly. Available for straight or tapered flasks in 3, 4, 5, 6, 7 and 8" lengths. Metal wedge plates available for tapered flasks in 3°—4°—5°. Write for full details and prices—today!

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7029 VINE STREET CINCINNATI 16, OHIO

Manufacturers of Core Oil • Parting • Core Compounds • Core Wash • Refractory Cements

# YOUR CASTING SALVAGE JOBS MAY NOT BE THIS DRAMATIC, BUT...

### Read how NI-ROD came to the rescue of a badly broken block!

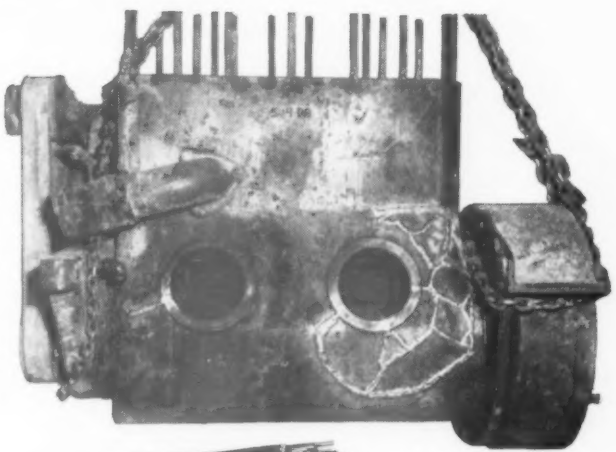
It looked like "curtains" for this cylinder block of a much-needed tractor motor.

Many shops might have scrapped it rather than have attempted to make repairs.

*But this shop knew about Ni-Rod*.*

They fitted the fractured parts together carefully. Then, with 1/8" Ni-Rod electrodes, they welded them securely in place.

Result: the motor block was restored to its original soundness, and the tractor was put back in service.



EMBLEM OF SERVICE
INCO NI-ROD

#### FOR NEW CASTINGS, TOO

Many foundries keep Ni-Rod handy to salvage defective castings. Such imperfections as porosity, blow-holes, underflush areas, and chill fractures are easily remedied with Ni-Rod.

Ni-Rod welds are strong, color-matching, and easily-machinable. Preheating is seldom necessary, slag removal is easy, and Ni-Rod gives you smooth bead contours. Experienced welders say: *"You can't beat Ni-Rod for strong, crack-free welds in cast iron!"*

Ni-Rod comes in 3/32", 1/8", 5/32", and 3/16" diameters. Order a five-pound package from your distributor—and see for yourself how easy it is to make on-the-spot casting repairs.

*Reg. U. S. Pat. Off.

**FREE—*new 8-page welding booklet. Mail the coupon!*** →

**THE INTERNATIONAL NICKEL COMPANY, INC.,** 67 Wall St., New York 5, N. Y.

The International Nickel Company, Inc.
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Please mail my copy of: *"NI-ROD . . . a new electrode for any cast iron welding."*

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.....Reach Roof Tops At This Level
.....High-tier Materials At This Point
.....Lifting or Loading Onto High Ramps or Platform
.....Average Height for 1001 Lifting Jobs Around Plant
...Runabout Level for Many Jobs Around Yard
..For The Short Hauls or Extra Heavy Lifts
Quickly Convertible to any other Boom Attachment . . . Shovel . . . Trenchoe . . . or standard Crane.

# Now...the UNIT 357 MOBILE CRANE with a TELESCOPIC BOOM

## 6 BOOM POINT LEVELS IN 1

- It Travels on its Own Power
- It Rides on Rubber
- It Goes Anywhere
- It Lifts Anything
- It Has 1001 Uses

This Unit Telescopic Boom broadens the scope of your Unit Crane. The boom is easy to adjust. It can be extended from a minimum of 16 feet to a full length of 26 feet, in progressive steps of 2 feet each. Merely remove 4 bolts, set boom at any desired height, replace bolts and the machine is ready for action. It lifts—loads—and hauls from any point to any place in or out of plant. Gas or Diesel power. Write for literature.

- A WORKING LEVEL FOR MANY JOBS IN YOUR PLANT
- IT WILL NEVER BE IDLE . . . DAY AFTER DAY
- HANDLES . . . LUMBER, MACHINERY, CASTINGS, STEEL, SKIDS . . . WITH EASE

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## A BLAST FURNACE PRODUCT

Smelted from Superior quality lake ores, high grade metallurgical coke and limestone, using our own local No. 1 Sharon Seam coal.

HIGH SILICON IRON JISCO

A "blend" with JISCO is sound metallurgy.

**THE JACKSON IRON & STEEL Company**
JACKSON, OHIO

# HAMILTON SPRAY GUN

COMPLETE WITH 4½ FT. SUCTION HOSE AND SINKER

$10.00

F.O.B. HAMILTON, OHIO

For spraying molds and cores with any liquid. For cleaning electric motors, gasoline motors and machinery. For laying dust.

Neoprene disc valve. Trigger control. Sturdy brass construction. Length overall 6½". Weight without suction hose and sinker 18 oz. Two nozzle sizes, ⅛" and ¼". Literature on request.

GUARANTEED COMPRESSED AIR PRODUCTS

AFTERCOOLERS • SEPARATORS • STRAINERS • TRAPS
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**JAS. A. MURPHY & CO.**
FIFTH AND VINE STREETS, HAMILTON, OHIO
*Moisture Elimination Up To 3000 Pounds Per Square Inch*

# IT'S NEW—IT'S SENSATIONAL

AMASTEEL
TRUALLOY
SHOT

LASTS MANY TIMES LONGER

Here is the peak efficiency in shot for BLAST CLEANING and PEENING.

AMASTEEL is much better than hard iron or malleable abrasives.

Investigate AMASTEEL Shot today. It lasts six times as long!

PRODUCERS OF
PEENBLAST
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ALLOY 99

ALLOY METAL ABRASIVE CO.
311 WEST HURON ST. ANN ARBOR, MICH.

# *New* LITHIUM CARTRIDGES

## *Improve non-ferrous castings . . . cut costs, eliminate guesswork*

Tests under production conditions in non-ferrous foundries demonstrate that Lithium Cartridges improve the quality of copper base alloys and high conductivity copper castings.

Lithium Cartridges eliminate all traces of entrapped gases if properly used under the right foundry conditions. This results in sounder castings.

Specifically, tensile strength and elongation are increased with attendant grain refinement.

Due to the small amount of Lithium required, this new technique is well within the economic limits of foundry operations.

These cartridges—metallic Lithium hermetically-sealed in copper tubing—come in three convenient sizes: 2.25 grams, 4.50 grams and 9.0 grams. This eliminates guesswork formulation common to some methods now in use.

Try these new Lithium Cartridges in your own plant. See with your own eyes how they can give you better castings at lower cost. Further details of these tests may be obtained without obligation by writing us today.

METALLOY CORPORATION
RAND TOWER MINNEAPOLIS, MINN.
Division LITHIUM CORPORATION OF AMERICA, INC.

★ Sharper Castings

★ Greater Brinell Hardness

★ Increase Tensile Strength

★ Increase Transverse Strength

★ Increase Wear Resistance

★ Increase Heat Resistance

# Copper Shot

**IMPROVES YOUR IRON**

ALTER COMPANY Fifty Years of Service

1702 Rockingham Road, Davenport, Iowa

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Some owners call it a...
"PORTABLE MACHINE SHOP"

STOW "STREAMLINER"

FLEXIBLE SHAFT MACHINE

- GRINDS
- FILES
- SANDS
- BUFFS
- DRILLS
- WIRE BRUSHES
- POLISHES
- SCOURS
- ROUTS

One flexible shaft machine does all the operations listed above. Tool goes to the job, anywhere in the shop. Speeds production — saves lifting of heavy parts — lets operator reach hard-to-get-at places easily.

½ HP to 1 HP variable or constant speeds. Choice of mounts: pedestal, high or low; bench; or suspended. Uses Stow Flexible Shafts — a guarantee of maximum service since 1875. Write for full information.

STOW MANUFACTURING CO.
23 SHEAR ST. BINGHAMTON, N. Y.

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THE STORY... OF THE DISAPPEARING SCRAP PILE

Here's how to make casting losses due to core blowing do the disappearing act.

Simply use Buffalo Brand Vent Wax to assure quick, positive venting of the most intricate core. Used by leading foundries for nearly forty years. A size for every need.

Write for generous free sample.

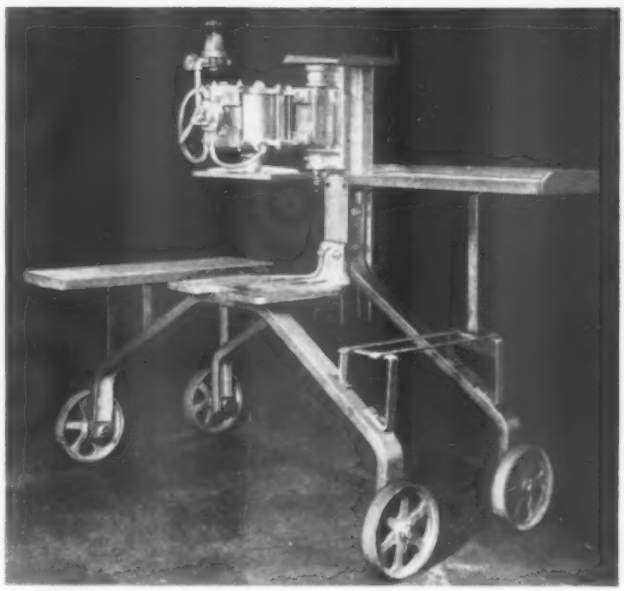
Buffalo Brand VENT WAX

UNITED COMPOUND COMPANY
328 South Park Ave., Buffalo 4, N.Y.

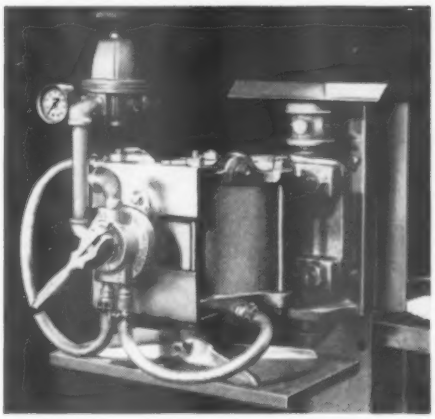
## GET FASTER, EASIER PRODUCTION WITH A NEW

# MOLINE 55

## AIR SQUEEZE MOLDING MACHINE



MOLINE 55 MOLDING MACHINE WITH PNEUMATIC HANNIFIN CYLINDER



CLOSE UP VIEW OF HANNIFIN PNEUMATIC CYLINDER

The new 55 heavy duty portable features a pneumatic cylinder for smooth, full power performance. Air replaces muscle enabling a molder to put up more molds faster and with less fatigue. Larger flasks and heavier jobs can be handled more effectively. The new 55 increases production and lowers foundry costs. It is ruggedly constructed for heavy duty and designed for smooth, simple, economical operation. Molders like them!

OVER SEVENTY YEARS OF SERVICE

WRITE FOR FURTHER INFORMATION AND PRICES

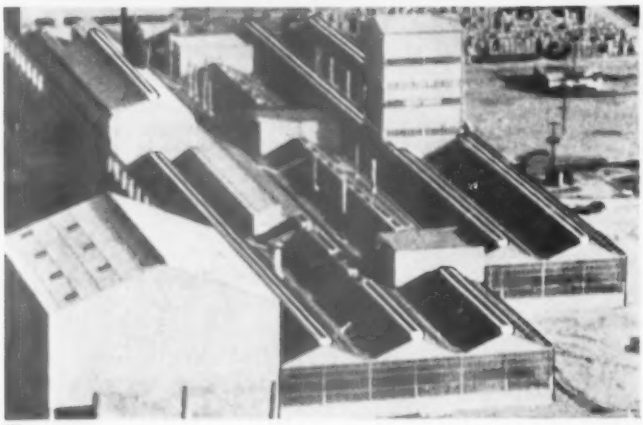
WE SHIP QUICK

MIW

MOLINE IRON WORKS
MOLINE, ILLINOIS, U. S. A.



## *Work thru the Summer* with SWARTWOUT VENTILATION



## Avoid Foundry shut-downs because of excess heat . . . install Swartwout Ventilators

HOT WEATHER shut-downs cause loss of time and profits. Insure everyday operation by providing *wholesale* removal of heat through Swartwout Roof Ventilators. Several Swartwout types offer a selection to suit your particular problem. Above illustration shows Swartwout-Dexter Heat Valve on the foundry of a prominent manufacturer. Other types used effectively for foundry ventilation are the AIRMOVER and Ject-O-Valve, shown below.

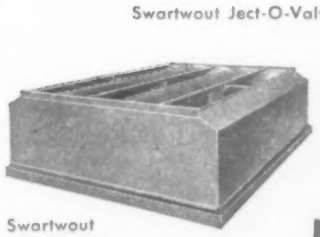
"During this summer we have been able to work throughout the season without any loss of time"—wrote a concern in Pennsylvania. "Ordinarily, during the summers before you installed your ventilators, we lost a great deal of time on account of the intense heat.". . .

Write for the Swartwout Ventilator Catalog and full details on the use of Roof Ventilators on Foundries.

## THE SWARTWOUT COMPANY

**18566 Euclid Ave., Cleveland 12, Ohio**

Swartwout Ject-O-Valve



Swartwout AIRMOVER

**Swartwout** *Controlled* **Air Circulation**

EQUIPMENT FOR EFFECTIVE ECONOMICAL VENTILATION OF INDUSTRIAL BUILDINGS

# SPECTROCHEMICAL ANALYSIS

**SIMPLIFIED**

. . . analysis completely made by a single technician

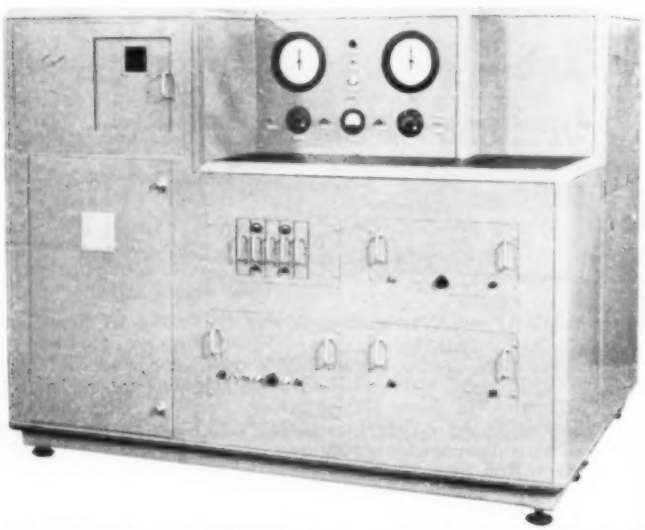
**SPEEDED**

. . . simultaneous determination of eight constituents obtained in 40 seconds

**MECHANIZED**

. . . line intensities automatically indicated on large, easily read dials

*with the Baird Associates-Dow*
**DIRECT-READING SPECTROMETER**

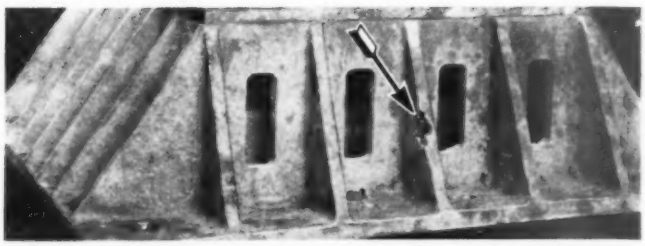


- **Production control analysis,** for the desired constituents, is obtained within 40 seconds after the operator has pushed the button that initiates the automatic analyzing cycle. The analysis requires no photographic darkroom, no specialized operating techniques, and no reading of graphs.
- **Precision of analytical determinations,** especially for low values, is equal or superior to that of present photographic means.
- **The operating principle** of the direct reading spectrometer involves spectral measurement of a spark or arc struck between two electrodes. The intensity of individual spectrum lines is measured with respect to standard lines by photomultiplier tubes; and the output of these tubes, suitably amplified, is used to trigger circuits that control indicating timers calibrated directly in concentration units.

Other special apparatus produced by Baird Associates, Inc. over the past decade include spectrographs, spectrographic power sources, density balances, infra-red spectrophotometers, microphotometers, infra-red gas analyzers, and Rayleigh interferometers.

**Baird Associates-Dow Direct-Reading Spectrometer offers the advantages of faster control analyses and restoration of skilled laboratory staffs to other functions. For detailed information, request Bulletin 26.**

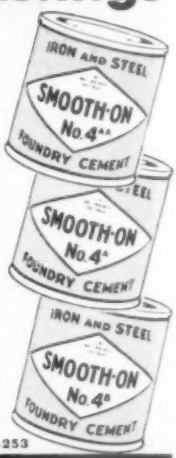
*Baird Associates, Inc.*
**INDUSTRIAL PHYSICISTS**
**33 UNIVERSITY ROAD CAMBRIDGE 38, MASS.**



**HOW TO DELIVER**
# Better Looking Castings

Fill in pores, sand holes, blow holes, pock marks, dents, etc. with Smooth-On No. 4 Foundry Cement and these imperfections practically disappear. You match color and texture of the metal and can file the surface smooth. In leading foundries this treatment of surface-blemished but internally sound castings is as routine as removing unsightly "fins".

Three shades to choose from. For light gray castings and polished surfaces, Smooth-On No. 4AA. For medium gray, medium lustre castings, Smooth-On No. 4A. For dark, lower lustre castings, Smooth-On No. 4B. If your supply house hasn't Smooth-On No. 4, write us. If you've never used Smooth-On we'll send you generous working sample.




**FREE 40-Page Handbook**

Shows uses for Smooth-On Foundry Cement and many plant and home jobs done with other Smooth-On Iron Cements — leaks stopped, cracks sealed, loose parts tightened. Write for YOUR free copy.

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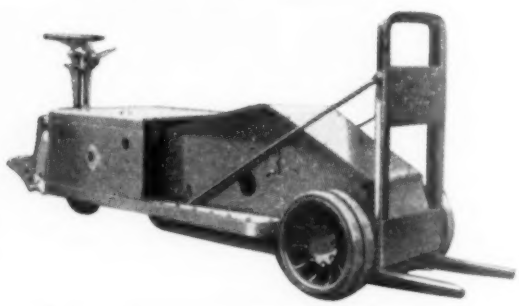
*Do it with* **SMOOTH-ON**
**FOUNDRY CEMENT**



ELWELL-PARKER FURNACE CHARGER, Type LF, capacity 6,000 lbs., with new PHILCO type XV-21, 15 cells battery, completely re-built with 60 day guarantee.

300 Lift truck platform skids, 9 ga. corrugated steel, 42" x 48" x 12" high legs, 11 ga. floor channel runners, reinforcing leg lugs.

FORK LIFT and PLATFORM TRUCKS, gas and electric, 2,000 to 10,000 lbs. capacity.

ELWELL-PARKER Model ELN-10 Die Handling Gas-Electric Platform Truck, 5 ton cap.

GRAVITY CONVEYOR—all sizes

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Our rigid raw material specifications, "lab" controlled processing, plus constant vigilance from original inspection to final shipment, assure uniform quality of Dayton Core Oil.

### 2. TECHNICAL ASSISTANCE

To assure your getting the proper oil for every job, allow our experienced engineers to assist you with your core room problems.

### 3. LABORATORY ANALYSIS

Twenty-eight years of experience in the core oil field and continual laboratory research for the properties required in quality core oils enable us to manufacture the oil best suited to your needs.

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## Look to DAYTON CORE OIL

- PRODUCE BETTER CORES
- AT LOWER OVER-ALL COST
- CLEANER, MORE UNIFORM CASTINGS

Also DOCO BINDER & CORE PASTE • DOCO STEEL CORE AND MOLD WASH

# WADSWORTH

## ANNOUNCES

## A NEW CORE EXTRUDER

*Totally enclosed gearing.*
*Totally enclosed ball bearings.*
*Totally enclosed ball bearing motor.*
*Direct motor driven.*

**Reasons why *YOU* should have this equipment.**

Cut stock core costs.
Low initial cost.
Low maintenance cost.
Ease of operation.
Requires less than 7 square feet of floor space.

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30th ANNIVERSARY

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FULLY MACHINED PATTERNS and CORE BOXES
of Aluminum, Magnesium, Bronze and Steel

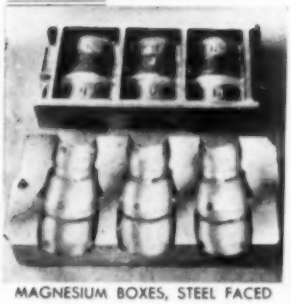
PressureCAST •PLATES •PATTERNS •CORE BOXES

PLASTIC •PLATES •PATTERNS •CORE BOXES

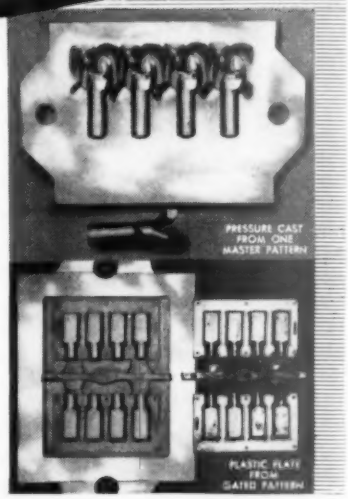
PERMANENT MOLDS and DIES

Non-ferrous Sand Castings . . . Zinc and Aluminum Die Castings

CENTRAL PATTERN CO., QUINCY, ILL.

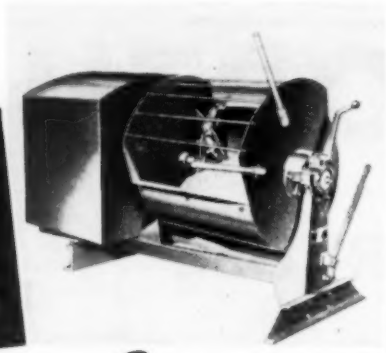


MAGNESIUM BOXES, STEEL FACED




CMC

## WONDER Sand MIXERS



*New Mixing Efficiency*

### EXCLUSIVE TRIPLE MIXING HOES . . .

Tops in the field! Triple mixing Hoes have adjustable blades . . . easily set for correct clearance. Mixing is *thorough* and "end to end". Advance CMC design makes charging and discharging *easier than ever before!* 6 cu. ft. capacity shown. Write today for full details.

### RENEWABLE DRUM LINERS

Easily, replaceable full-hard abrasion resistant alloy steel drum liners are your assurance of lowest upkeep and minimum operating costs.

CONSTRUCTION MACHINERY CO'S. WATERLOO, IOWA, U.S.A.

*Proved by*

# PERFORMANCE

*in the* **HOT** *spots*

- *Soaking Pit Cranes*
- *Ladle Cranes*
- *Charging Cranes*
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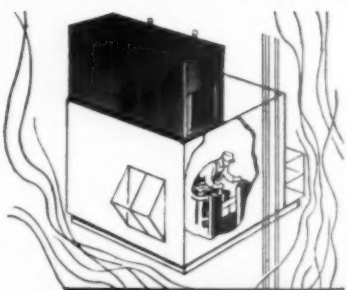
- *Fabrication Shop Cranes*
- *Annealing Cranes*



**DRAVO CRANE CAB COOLERS**

**REPEAT ORDERS** from steel, iron and non-ferrous metal producers offer proof of the outstanding results where Dravo Crane Cab Coolers reduce fatigue and improve operator performance. It's worth your while to call or wire Dravo for case history details of these applications.

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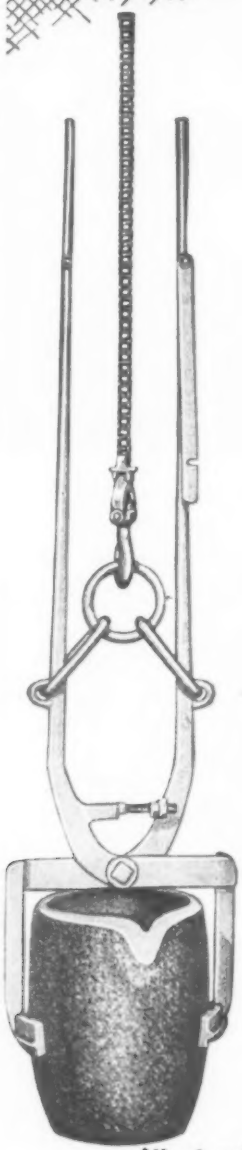
# New Cradle Type CRUCIBLE TONGS



Here is the latest advance in tong engineering.

One glance at the illustration shows how simple the Industrial design actually is. And not only is it simple, it's *adjustable*. Turn the adjustment screw when necessary to compensate for wear and the four pads on the cross-arm or claws engage the pot firmly for lifting or carrying.

You will notice that this design is not complicated. It's simple, it's safe, yet it does everything you expect of a tong.

Notice also the Industrial design carries the crucible in the same manner as in the pouring shank. There is no crushing or pinching of the sidewalls. Eliminated are cracked pots from this cause.

Industrial furnishes this tong for all makes and sizes of crucibles. Write for details today.

- LIGHT WEIGHT
- ADJUSTABLE
- LESS EXPENSIVE
- EXTENDS CRUCIBLE LIFE
- POSITIVE, SAFE CONTROL

*All standard types available*

*Industrial*
EQUIPMENT COMPANY
115 N. OHIO ST. MINSTER 2, OHIO

LATEST CATALOG AVAILABLE



FOR EFFICIENT AIR GAS RATIO CONTROL

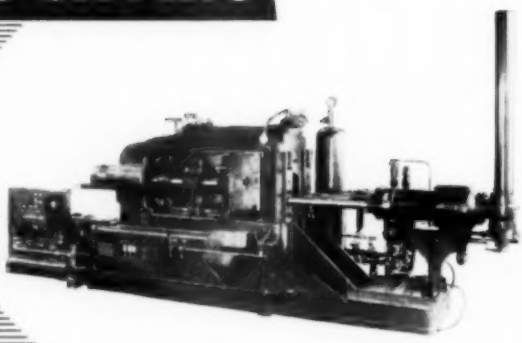
# McKEE AIR-GAS PROPORTIONAL MIXERS

**McKee Proportional Mixers are designed for all industrial applications. They're adjustable to handle changes in heat content or specific gravity of a wide variety of gaseous fuels . . . they're flexible for use with a range of gas or air pressures . . . they're automatic to provide a correct combustion ratio at all times. Ask for full information on these dependable, economical mixers.**

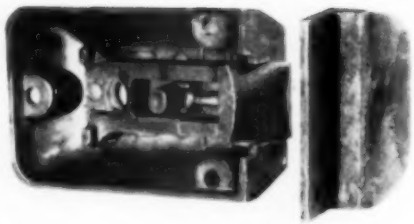
Eclipse Fuel Engineering Company
ROCKFORD ILLINOIS
McKee Eclipse

# THE KEY

# TO SAVING



# ON LOCK PARTS



*Write for your free copy of the Lester Press.*

When you are looking into costs, be sure to check your forgings, stampings and castings. More than one company has found that die casting such parts on Lester-Phoenix equipment has given them that needed price edge to surpass growing competition.

Take Corbin Cabinet Lock Division of the American Hardware Corp. The parts for their 3A6 night latch were previously made of gray iron castings and brass. They started casting these parts on their heavy duty Lester-Phoenix die casting machines (shown here) and, as a result, they say, "There is a considerable saving in the weight of the metal and also in the amount of machining that has to be done on these parts".

Lester-Phoenix die casting machines and Lester engineers provide the key to sound, economical die casting. Let us help you solve your die casting problems.

**LESTER-PHOENIX**
**DIE CASTING MACHINES**

*Distributed by* **LESTER-PHOENIX, INC.**
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## SPECIAL
# FOUNDRY COKE

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Manufactured at Terre Haute, Indiana by INDIANA GAS & CHEMICAL CORPORATION

*DOUBLE YOUR PRODUCTION—with the fastest and most powerful Rammer made—*

# NO. 4 DAYTON RING VALVE BENCH RAMMER

•

Aside from its efficiency, the chief advantage of this Rammer lies in its long life. The Valve Unit will last for years without repair or replacement. The Cylinder Bore and Piston Rod are HARD CHROME PLATED, features which double the life of the Rammer and reduce maintenance costs at least one-half.

Have been adopted as standard by some of the largest users of Rammers throughout the Country. MADE IN FIVE SIZES. Send for Bulletin No. 300.

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100 lbs AMERICAN SHOT
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American Steel Shot and Grit give you top blast cleaning performance because American's own method of manufacture assures you of uniformity of size and hardness in every abrasive pellet. American abrasives last longer, clean faster, never break apart. You get maximum economy in your blast cleaning operations. American Shot and Grit is graded to all S.A.E. specifications . . . comes in 100-lb. bags.
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**The American Steel Abrasives Company**
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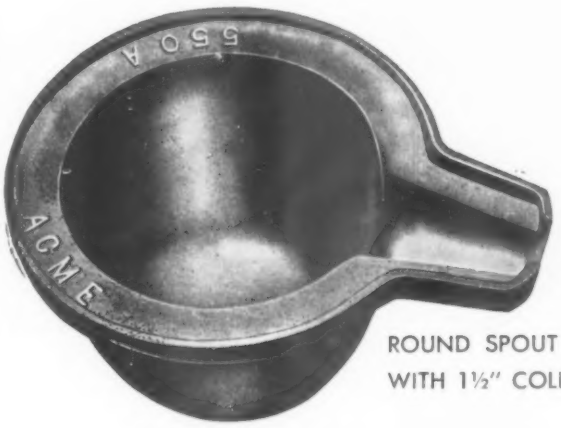
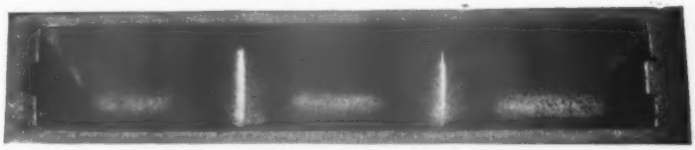
# MELTING POTS—Ingot Molds

for ALUMINUM AND OTHER NONFERROUS METALS. 45 SIZES.




ROUND SPOUT POT NO. 550A
WITH 1½" COLLAR ON FLANGE



INGOT MOLD NO. AA-6

**WRITE**
for CATALOG "F"

HOLDING BOWL
NO. HP7001

*Made of Acme SPECIAL-M-Heat Resisting Iron — They Stand the Heat!*

## ACME FOUNDRY COMPANY

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## LIQUID BINDER

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## DRY BINDER

***For***

***CORE WORK, SAND FACINGS, SPRAYS***

Write for pamphlets giving detailed information. Both materials carried in stock by America's foremost foundry jobbers

**Robeson Process Company**
(Established 1905)

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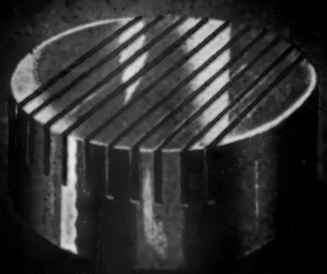
*Precision*



## CORE BOX VENTS

Here's part of a complete line of DEMMLER core box vents—rigidly constructed in varying sizes of slotted brass—slotted steel—and screen mesh. Orders filled promptly from stock.

BRASS SLOTTED CORE BOX VENTS
Slot widths: .010", .013", .015"
Diameters: ⅛", 3/16", ¼", 5/16", ⅜", 7/16", ½", ⅝", ¾", ⅞", 1", 1¼", 1½"

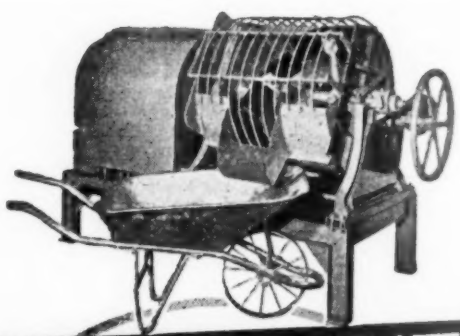
STEEL SLOTTED CORE BOX VENTS
Slot widths: .010", .013", .015"
Diameters: ⅛", 3/16", ¼", 5/16", ⅜", 7/16", ½", ⅝", ¾", ⅞", 1", 1¼", 1½"

SCREEN TYPE CORE BOX VENTS
Mesh: #30, #40, #50.
Diameters: ⅛", 3/16", ¼", 5/16", ⅜", 7/16", ½", ⅝", ¾", ⅞", 1", 1¼", 1½"

SPECIFICATION CIRCULAR ON REQUEST

*Wm.* **DEMMLER** *& Bros.*
*Kewanee, Illinois*





# BLYSTONE
## • MIXERS •

THE paddle-type mixer for core sand mixing in the foundry. Blystone Mixers offer: low mix cost, thorough mixing, and easy operation. There is a sturdily built type and size for your problem. Send for Bulletin and full details.

• BLYSTONE DIVISION •
STANDARD SAND & MACHINE CO.
549 W. Washington Boulevard, Chicago, Illinois

8 A.M. EFFICIENCY

maintained **ALL DAY** with **ORTON**

*POWERMATIC*

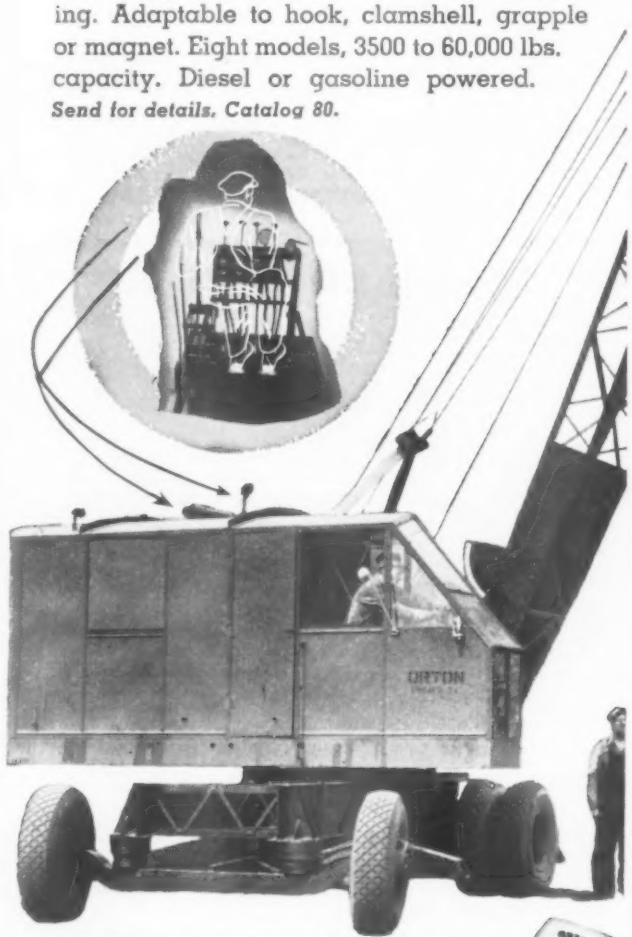
AIR-CONTROL

**AERO-CRANE**

No afternoon *fatigue let-down!*

**One man,** with the Powermatic Air-Control Orton Aero-Crane loads and unloads cars and trucks, gets material onto the stockpile and off with *early morning efficiency* all day. High mobility job to job. Full-view cab. Full circle turn-table. Anti-friction bearings. Non-burn Orcoin V-type clutches. Orton SAFETY engineering. Adaptable to hook, clamshell, grapple or magnet. Eight models, 3500 to 60,000 lbs. capacity. Diesel or gasoline powered.

***Send for details. Catalog 80.***



Long-life Orton Aero-Crane has most rigid car body of any crane built. Goes anywhere a truck will go. One man does the work of four handling yard jobs that eat up the time of a crew.

**ORTON** CRANE AND SHOVEL COMPANY
608 SOUTH DEARBORN STREET
CHICAGO 5, ILLINOIS

*cut glove costs*

**JOMAC Gives Better Hand Protection 5 WAYS!**

- **Double life . . . Interchangeable . . . Fits either hand**
- **Washable . . . Gives extended wear**
- **Protects against sharp metal edges . . . Improves grip**
- **Completely flexible . . . Permits full hand freedom**
- **Heat- and Flame-Resistant . . . Will not retain heat**

**JOMAC** Heat- and Flame-Resistant Work Gloves are made to meet specific requirements for better hand protection—to give longer, more economical wear under the most exacting conditions. Write us today about your hand-protection problem. We will be glad to recommend the proper Jomac glove for the job.

**C. WALKER JONES CO.**

*All Ways a* JOMAC *Glove to Fit the Job*

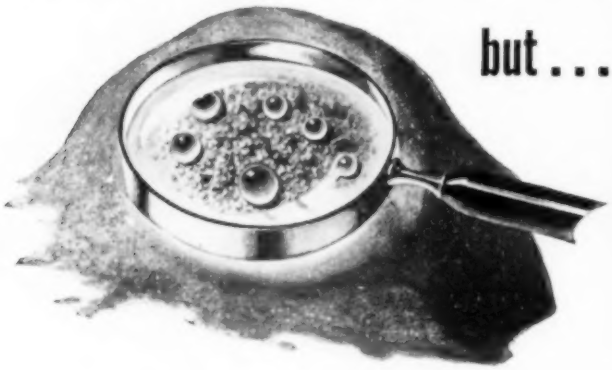
**6147 N. Lambert Street, Philadelphia 38, Pa.**

**JOMAC gloves are being used in**

Buffing Operations
Rubber Industry
Plastics Industry
Ceramics Industry
Foundries
Glass Plants
Metal Handling
Heat Treating

Will outwear mineral fiber gloves!

## THIS IS ORDINARY WATER AND SAND



but . . .

water treated with

**COMPOUND M** wets sand

***thoroughly . . . quickly . . . uniformly***

Ordinary water has a tendency to form relatively strong and large drops which cling to surface sand and fail to penetrate. It is this principle which makes uniform wetting of sand difficult with plain water. But break or reduce the surface tension with Compound M and water penetrates rapidly right through to the bottom of the sand pile, *without flooding.*

The Compound M method of conditioning foundry sand means more efficient and lower cost production of ferrous and non-ferrous castings. Yet Compound M costs little to use.

### COMPOUND M *CONTROLS DUST . . . MAKES WASHING EASIER AND QUICKER, TOO*

The same qualities of Compound M treated water which make it so valuable in conditioning foundry sand, also make it unusually useful in controlling foundry dust and washing foundry windows. Water treated with Compound M, covers a vastly greater area than ordinary water. It captures and holds dust in the air and on the ground or floor.

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**USE THIS COUPON**

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Please send me at once your Bulletin F3 "Foundry Dust Control and Sand Conditioning".

Company Name.....

Address.....

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Your Name.....

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*For Foundry Sand Conditioning*

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Not just another floor stand grinder, but the heaviest, most rugged and durable snagger available. Not a 3500 lb. but a 5000 lb. machine.

Not built to sell at a price, but built with primary consideration for power, mass and dependable durability.

Quicker stock removal and longer wheel life with ease and dependability of adjustments.

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Model AS

Model J

These machines used to make ferrous and non-ferrous centrifugal castings are produced by the pioneer manufacturer of such equipment.

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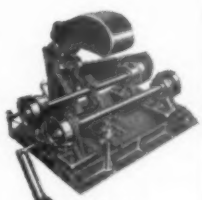

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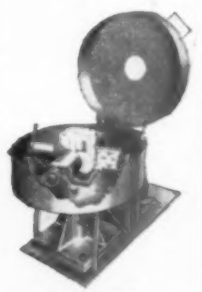
Send us drawings or sketches of parts you are interested in casting centrifugally, and we will tell you, without obligation, if and how our machines can cast them faster, cleaner and with fewer rejects.



Model J-P

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FOR ITS ABILITY TO STAND UP UNDER REPEATED HARD USE

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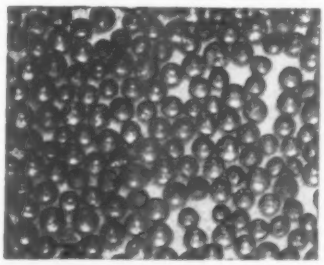

UNRETOUCHED PHOTO OF HI-GRADE SHOT

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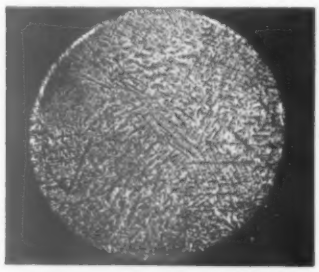
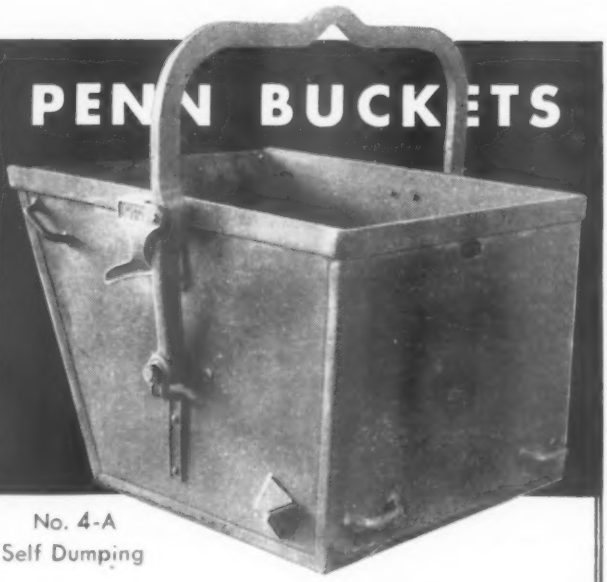


MICROSCOPIC STRUCTURE OF METAL

PENN BUCKETS



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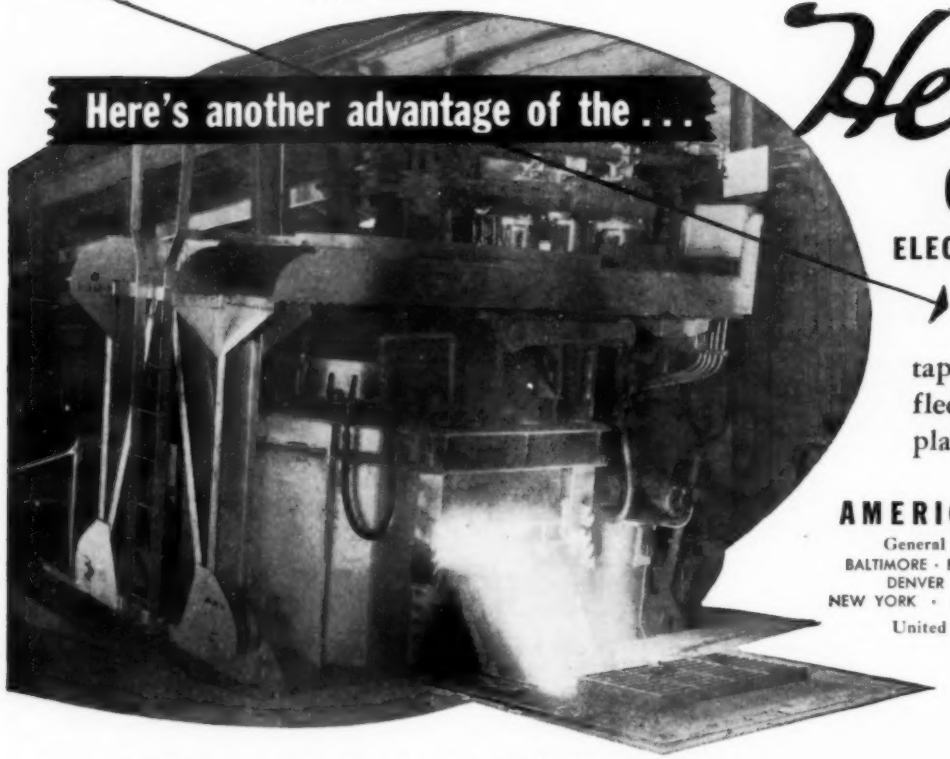

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In both Double (shown) and Single Head types of "Buffalo" *LEEK-PRUF* Chaplets, the chief factor of efficiency is the exclusive fin design.

Integral with the stem, this extremely thin section protrudes to its full width. There is no recess in the stem to cause weakness. The advantages of this original fin design speak for themselves.

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# HELPFUL LITERATURE

*NOTE TO READERS: If you will check the item or items described which particularly interest you, we will be glad to request the manufacturers concerned to send you their literature. Use the attached postal card.*

### 1. Diecasting Machines

Miller-Taylor Tool Co.—24-page illustrated catalog on Cast-Master diecasting machines explains features of this line which includes plunger gooseneck models for production of zinc, lead and tin castings and cold chamber types for producing aluminum, brass and magnesium diecastings.

### 2. Investment Casting

Alexander Saunders & Co.—8-page illustrated bulletin "An Introduction to Precision Investment Casting" explains possible uses of parts produced by this method and shows typical equipment employed in making precision castings by the 'lost wax' process.

### 3. Storage Racks

Barrett-Cravens Co.—16-page illustrated bulletin No. 4873 shows how storage capacity in industrial plants has been increased by utilizing overhead space through installation of barrel and drum racks and skid racks.

### 4. Portable Tools

Skilsaw, Inc.—28-page illustrated catalog No. 49-1 describes and gives specifications of complete line of portable power tools for industrial plant use. Available tools include electric and pneumatic drills, disk sanders and grinders, portable and bench grinders, belt and oscillating sanders, blowers and suction cleaners, and portable and stationary saws. Accessories for use with these tools are described also.

### 5. Crucibles

American Crucible Co.—4-page illustrated bulletin lists sizes and capacities of Starbide carbon-bonded silicon carbide crucibles which are light in weight and hold more metal than conventional crucibles of same outside dimensions.

### 6. Ventilating Fans

Schwitzer-Cummins Co.—8-page illustrated booklet "Fresh-Air Maker Ventilating Fans" and insert describe ventilating fans; show various installations; and give instructions for installing them on side wall, in suction box, in ceiling, in windows, on roof, in basements and other locations.

### 7. Power Dump Truck

Frank G. Hough Co.—4-page illustrated "Job Study No. 10" presents case studies of bulk materials handling operations in large foundry. Use of Payloader and Payloader Buggy to handle coke, slag, cores, sand and other materials for specific operations are described in detail.

### 8. Grinding & Pulverizing

Hardinge Co.—4-page illustrated bulletin AH-387 gives details on grinding and pulverizing mills and shows their application in mining, metallurgical, steel and iron industries. Conical, cylindrical, rod, tube and batch mills are described.

### 9. Molybdenum Cast Irons

Climax Molybdenum Co.—26-page booklet "Applications of Molybdenum Cast Irons" lists typical applications of gray cast irons containg molybdenum; charts tensile strength and hardness of gray irons with various combinations of carbon and silicon, with and without alloying elements; and tabulates compositions and other information regarding typical applications of white cast irons containing molybdenum.

### 10. Specimen Grinders

Buchler Ltd. — 6-page illustrated folder "Surfacers and Grinders" describes wet power and bench grinders and belt surfacers which are designed for preparation of specimens in the metallurgical laboratory.

### 11. Roof Ventilators

American Machine & Metals, Inc., DeBothezat Fans Div.—12-page illustrated bulletin No. DP-3-48 describes Power-Flow roof ventilators which consist of motor driven fan built into weatherproof housing. Mounted on factory roof, it provides positive, controlled ventilation at all times, independent of wind and weather.

### 12. Dust Collectors

W. W. Sly Mfg. Co.—8-page illustrated bulletin "Photographs of Actual Sly Dust Collector Installations" shows equipment in use and explains dust hazard involved.

### 13. Power & Gravity Conveyors

Conveyor Systems, Inc. — Illustrated publication is composite of numerous bulletins describing special conveyor installations and equipment; tubular chain; slat, chain and belt conveyors for handling of packaged materials and parts; gravity conveyors for low cost package handling; bulk handling conveyors; and overhead trolley conveyor systems.

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### 14. Cranes & Monorails

Whiting Corp.—Illustrated catalog "Whiting Light Cranes & Monorails" is composite of six bulletins dealing with Trambeam overhead materials handling system. This consists of especially constructed open rails which are suspended by flexible connectors to supporting structure to relieve stresses, speed up installations and facilitate operation.

### 15. Hoists

Euclid Crane & Hoist Co.—12-page illustrated bulletin No. 838 describes and gives specifications of standard types of hoists ranging in capacity from 1000 to 30,000 pounds. Also covered are No. 4 hoists in capacities of 250 to 1000 pounds.

### 16. Refractories

Babcock & Wilcox Co.—18-page illustrated bulletin R-22 gives specifications, application data and other information on refractory castables, plastics and mortars for furnace applications at temperatures as high as 3100° F.

### 17. Floor Truck-Conveyor

Jervis B. Webb Co.—4-page illustrated bulletin No. 1217 on Towveyor floor chain conveyor shows how common shop trucks equipped with vertical pin can be moved mechanically around plant. Chain conveyor running below continuous slot in floor is equipped with pusher dogs which engage pins on trucks to move them around conveyor circuit.

### 18. Rotary Positive Blowers

Roots-Connersville Blower Corp.—20-page illustrated bulletin No. 22-23-B-13 outlines operating advantages, principles and chief uses of rotary positive blowers which are available in wide range of sizes up to 50,000 cubic feet per minute and for pressures up to 10-pound gage in standard construction.

### 19. Couplings, Clamps & Valves

Hose Accessories Co.—4-page illustrated condensed catalog No. 149 describes LE-HI line of hose couplings, hose clamps, air valves, manifolds, throttle valves for compressed air service, air hammer hose couplings, special high pressure couplings, long shank couplings for low pressure steam and spray hose.

### 20. Centrifugal Blowers

Lindberg Engineering Co.—4-page illustrated bulletin No. 740 deals with single stage centrifugal blowers available in sizes for use where up to 20-ounce pressure is required, combination blower and oil pump units, and V-belt blowers. Installation of blowers is facilitated by 360-degree positioning of air outlet.

### 21. Portable Elevating Table

Midwest Tool & Engineering Co.—4-page illustrated bulletin describes hydraulic portable table which facilitates handling of tools and dies onto presses, feeding of stock, work holding and general utility operations.

### 22. Box Car Loader & Piler

Stephens-Adamson Mfg. Co.—Two illustrated bulletins Nos. 948 and 1046 present information on centrifugal loader and piler for filling box cars and storage bins and Swiveloader centrifugal belt type high-speed thrower which can be swung through box car door and directed by operator outside car.

### 23. High Temperature Cement

Chas. Taylor Sons Co.—6-page illustrated bulletin No. 507 discusses properties and application of Tayco-40 high temperature silica cement for bonding silica refractories in construction of open-hearth and electric arc melting furnaces.

### 24. Power Scoop Truck

Butler Bin Co., Carscoop Div.—1-page illustrated specification sheet No. 24-A presents complete data on gasoline engine and electric motor powered Carscoop which is designed for handling all types of bulk materials and is particularly suited for unloading boxcars as well as general plant application.

### 25. Aluminum Alloys

American Smelting & Refining Co., Federated Metals Div.—24-page technical handbook "Aluminum Alloys, U. S. Standard Specifications" is compilation of latest specifications of ASTM, AMS, SAE, Federal, Army, Navy and others as they pertain to aluminum sand castings, permanent mold castings, diecastings, wrought alloys and ingots.

### 26. Compressed Air Cleaner

Jas. A. Murphy & Co.—4-page illustrated bulletin P deals with Paragon C cleaner which removes dirt, oil and moisture from compressed air at point of use. Designed to supplement regular pipeline aftercooler and separator, unit is installed just ahead of air delivery point to remove last traces of foreign matter.

### 27. Foundry Molding Machines

Tabor Mfg. Co.—44-page illustrated catalog "Foundry Molding Machines & Abrasive Cutoff Machines" contains bulletins dealing with jar, plain-squeeze and jar-squeeze flask-lift machines; squeezers and jar squeezers; plain and shockless jarring machines; and rollover machines.

### 28. Industrial Trucks

Crescent Truck Co.—4-page illustrated bulletin No. 1006 describes 20 different models of electric industrial trucks and tractors. Included is questionnaire to aid user in determining correct type and model of truck for various operations.

### 29. Space Heaters

Dravo Corp.—12-page illustrated bulletin No. 523 describes Counterflo forced air space heaters in standard output capacities from 400,000 to 2,000,000 British thermal units per hour. Heaters are direct-fired either by oil or gas and can be supplied with combination burners for quick conversion from one fuel to another.

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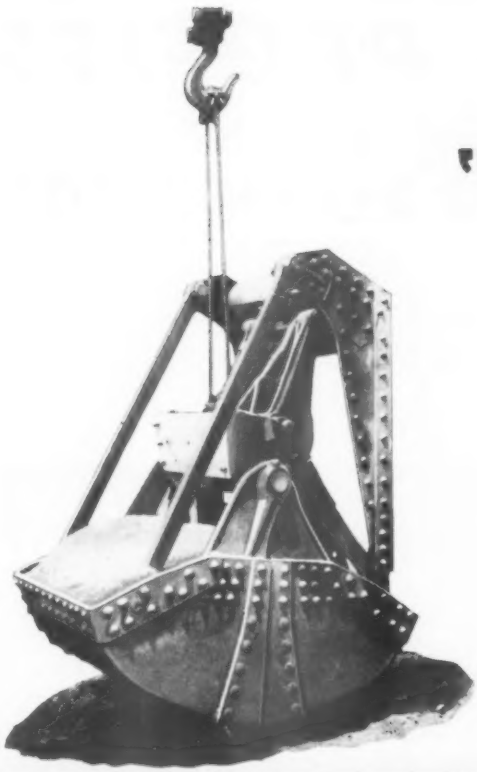

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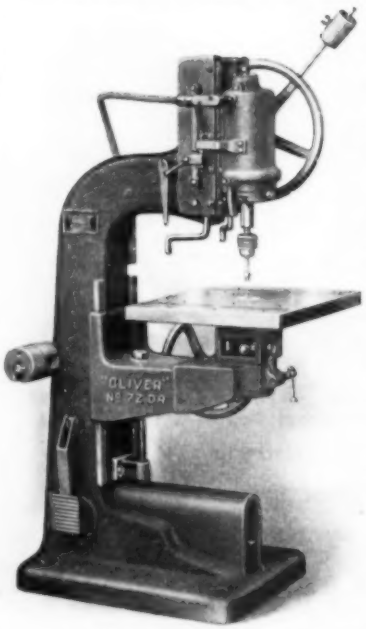
## PATTERN ROUTER AND BORER




- For rapid and accurate boring, milling or routing, light shaping, and recessing of small core boxes and patterns, this "Oliver" is a valuable time-saver.
- In one stroke it will bore a hole up to 2" diameter up to 6" deep, in the center of 36" stock.
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- This sturdy "Oliver" turns out work rapidly. Makes difficult jobs look simple. And it's easy to operate.

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## TENNESSEE SAND
### AS YOU LIKE IT

Shipped year round from 60,000 ton covered storage, stock shed or controlled moisture, mulled and screened thru 1/16" openings. Average blend of three sands with close laboratory control during processing maintains uniform clay and grain on over 50 standard grades. SOLD WITH SERVICE.

**THE AYERS MINERAL COMPANY**
*Ohio and Tennessee Molding Sands*
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## by "LOW HEAT" WELD PROCESS!

Low Temperature **EUTECTIC** WELDRODS

"Eutectic Low Temperature Weldrods" solve salvage problems the modern way by reclaiming castings at low heat — avoiding distortion, stress, warping, and machining difficulties.

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**MODERN GRINDING ROOM?**

**SAVE TIME!**
**SAVE WHEELS!**

TYPE H M

Here's the Standard Type HM Multi-Speed Heavy Duty Snagging Grinder with its overhanging base (7½" extension from body of base). Overhanging base gives more room for grinding. You can reach those surfaces which are inaccessible for straight front base machines!

Maximum wheel life. Single or multiple speeds. 3 H.P. to 7½ H.P. for 14" to 20" vitrified or resinoid bond wheels. Multiple speed units have interlocking arrangement to prevent overspeeding of wheels.

Get the facts on this ideal grinder today! Write for Catalog 44.

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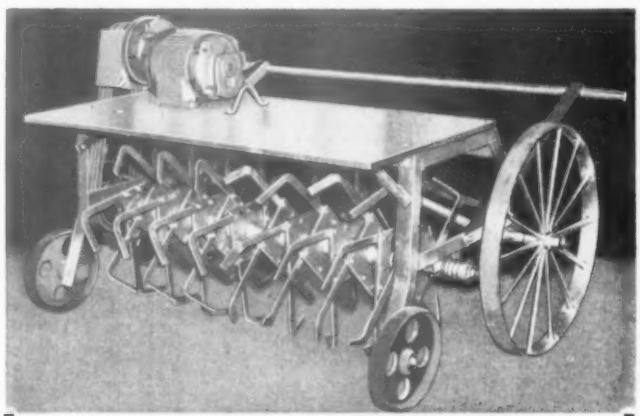

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Will thoroughly cut, mix and aerate approximately two tons of sand per minute, heaping sand in neat, triangular-shaped windrow. A simple, lightweight unit, durably constructed. Requires negligible maintenance. Write NOW for FREE literature.

S&B SANDCUTTERS

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**Measure Foundry Temperatures Accurately . . . at a Glance!**

**Use the Simplified PYRO Optical Pyrometer**

Any operator can quickly determine temperatures of minute spots, fast-moving objects and smallest streams with the simplified PYRO Optical Pyrometer. Proved in actual use . . . foundrymen swear by it!

SELF-CONTAINED—DIRECT READING—No correction charts, accessories or upkeep needed!

ACCURATE—"Special Foundry Type" and "Triple Range" models also have Red correction scale to determine *true spout* and *pouring* temperatures of molten steel and iron when measured in the open.

LIGHT IN WEIGHT—Weighs only 3 lbs. complete.

AVAILABLE IN 5 RANGES from 1400° to 7500° F.

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## *For Better Temperature Control in Non-Ferrous Foundries*

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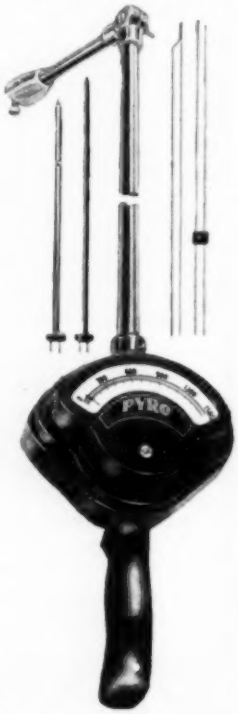


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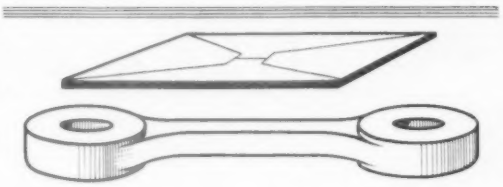

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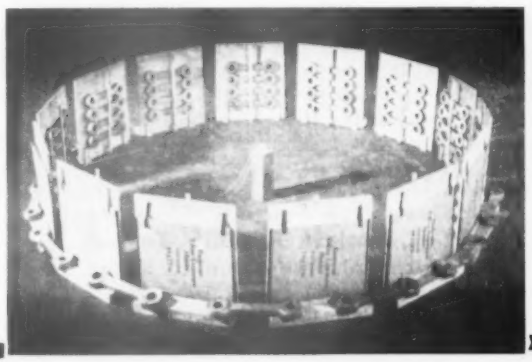
*Illustration shows 60 steel castings being photographed simultaneously. The gamma rays, flying in all directions, go through all the castings at once, making 60 exposures of the 60 castings.*



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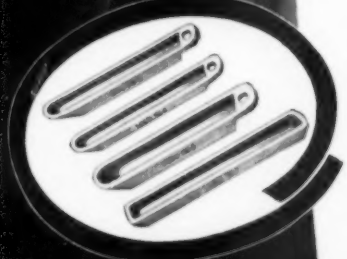

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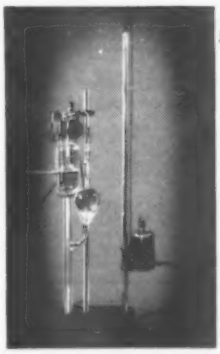

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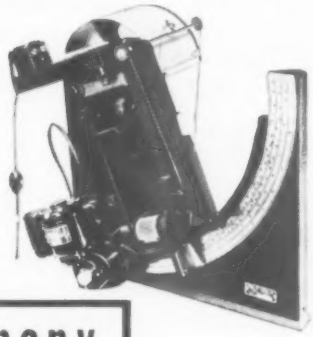

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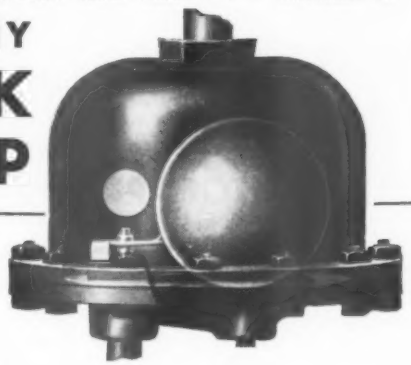

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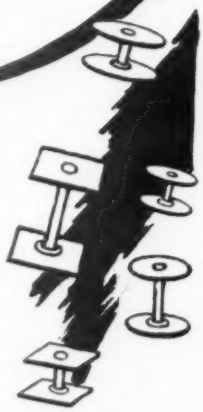

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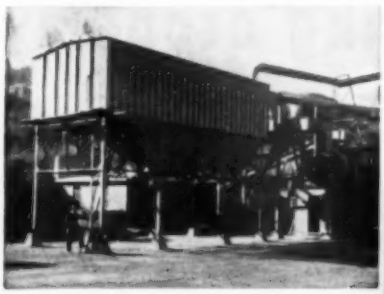

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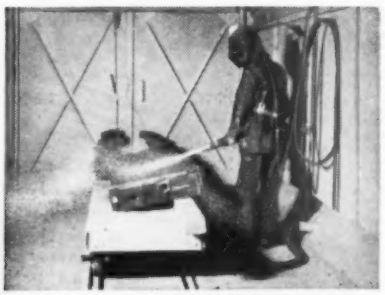

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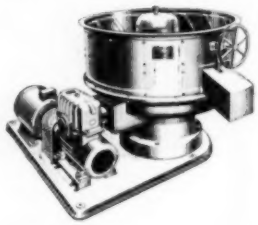

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Bartlett & Snow, C. O. Co., 6201 Harvard Ave., Cleveland 5, O.
Neff & Fry, Camden, O.

### BLACKING (Mold Core)

Bloomsbury Graphite Co., Bloomsbury, N. J.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Stevens, Frederic B., Inc., Detroit 16, Mich.
Superior Flake Graphite Co. 33 So. Clark St., Chicago 3, Ill.
United States Graphite Co., Saginaw, Mich.

### BLASTING EQUIPMENT

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Pangborn Corp., Hagerstown, Md.
George Pfaff Inc., 11-61 Jackson Ave., Long Island City, N. Y.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.

### BLAST METERS

Foxboro Company, Foxboro, Mass.

### BLOW GUNS

U. S. Air Compressor Co., 5300 Harvard Ave., Cleveland 5, Ohio

### BLOWERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
Campbell Hausfeld Co., Harrison, O.
Fisher Furnace Co., 2453 West Hubbard St., Chicago 12, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.

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**BLOWERS (cont'd.)**

Johnston Mfg. Co., Minneapolis 13, Minn.
Joy Mfg. Co., La-Del Division, New Philadelphia, Ohio.
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Spencer Turbine Co., Hartford, Conn.
Stroman Furnace & Engineering Co., Division of Peterson Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

**BOLTS and NUTS**

American Bridge Co., Frick Bldg., Pittsburgh 19, Pa.

**BOND CLAY**

American Colloid Co., 363 W. Superior St., Chicago 10, Ill.
Baroid Sales Division, 830 Ducommun St., Los Angeles 12, Calif.
Eastern Clay Products Inc., Jackson, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Great Lakes Foundry Sand Co., United Artists Bldg., Detroit 26, Mich.
Ironton Fire Brick Co., Ironton, O.

**BOOKS (Technical)**

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Black, Sivalls & Bryson, Inc., 720 Delaware, Kansas City 6, Mo.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
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Diamond Clamp & Flask Co., Richmond, Ind.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24, Pa.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.
Wadsworth Equipment Co. 2457 Mogadore Rd. Akron, Ohio

**BOWLS and SHANKS**

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**BOXES (Tote)**

Penn Iron Works, Reading, Pa.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.

**BRAKES (Magnetic)**

Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

**BRICK (Refractory)**

Carborundum Co., Perth Amboy, N. J.
A. P. Green Fire Brick Co., Mexico, Missouri
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Norton Co., Worcester 6, Mass.
Robinson Clay Product Co., 1100 Second National Bldg., Akron, Ohio.
Chas. Taylor Sons Co., Carew Tower, Cincinnati 2, Ohio

**BRIQUETS (Alloy)**

Climax Molybdenum Co., 500 Fifth Ave., New York 18, N. Y.
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.

**BRIQUETS (Ferro Alloy)**

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.

**BRIQUETS (Silicon Carbide)**

Carborundum Co., Perth Amboy, N. J.

**BRIQUETING MACHINERY (Metal)**

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Independent Pneumatic Tool Co., Aurora, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

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Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, O.
Erie Steel Construction Co., Erie, Pa.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Penn Iron Works, Reading, Pa.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

**BUILDING and ENGINEERING SERVICE**

American Bridge Co., Pittsburgh 19, Pa.

**BURNERS (Acetylene, Oil, Gas, Powdered Coal, Stoker)**

Fisher Furnace Co., 2453 West Hubbard St., Chicago 12, Ill.
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Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Smillie & Co., C. M., 1100 Woodward Hgts. Blvd., Ferndale, Mich.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Universal Engineering Co., Frankenmuth, Mich.

**CALCIUM BORIDE**

Molybdenum Corporation of America, Pittsburgh 19, Pa.

**CALCIUM MOLYBDATE**

Climax Molybdenum Co., 500 Fifth Ave., New York 18, N. Y.
Molybdenum Corporation of America, Pittsburgh 19, Pa.

**CARBON BOOSTER**

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Superior Flake Graphite Co. 33 So. Clark St., Chicago 3, Ill.

**CARS (Core Oven)**

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

**CARS (Mold Drying)**

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

**CASTINGS**

City Pattern Foundry & Machine Co., 1165 Harper Ave., Detroit 11, Mich.
Wheland Co., Chattanooga, Tenn.

**CASTING MACHINES (Centrifugal)**

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Centrifugal Casting Mach. Co., Tulsa, Okla.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

**CASTING MACHINES (Permanent Mold)**

Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.

**CASTING PLASTER**

United States Gypsum Co., 300 W. Adams St., Chicago, Ill.

**CASTING SEALER**

Tousey Varnish Co., 520 West 25th St., Chicago 16, Ill.

**CASTINGS (Permanent Mold)**

Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.

**CASTINGS (Precision Investment)**

Precision Metalsmiths, Inc., 6511 Cedar Rd. Cleveland, Ohio

**CEMENT (Metallic)**

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Smooth-On Manufacturing Co., 570 Communipaw Ave., Jersey City 4, N. J.

**CEMENT (Refractory)**

Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., Perth Amboy, N. J.
Fisher Furnace Co., 2453 West Hubbard St., Chicago 12, Ill.
A. P. Green Fire Brick Co., Mexico, Missouri
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Ironton Fire Brick Co., Ironton, O.
Keystone Refractories Co. 120 Liberty St., New York 6, N. Y.
Norton Co., Worcester 6, Mass.
Robinson Clay Product Co., 1100 Second National Bldg., Akron, Ohio.

**CEREAL BINDERS**

Foundry Service Co., Birmingham, Ala.
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General Cerium Co., 1038 River Road, Edgewater, N. J.

**CHAIN (Hoist, Conveyor, Drive, Sling, etc.)**

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Cleveland Chain Mfg. Co., Broadway & Henry Sts., Cleveland 5, Ohio
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus, O.
Joy Mfg. Co., Joy Division, Pittsburgh, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Taylor Chain Co., S. G., Hammond, Ind.

**CHAIN (Steel Loading)**

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Chain Mfg. Co., Broadway & Henry Sts., Cleveland 5, Ohio
David Round & Sons, Broadway & Henry Sts., Cleveland 5, Ohio

**CHAIN (Welded and Weldless)**

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Chain Mfg. Co., Broadway & Henry Sts., Cleveland 5, Ohio

**CHAINS (Sling)**

Cleveland Chain Mfg. Co., Broadway & Henry Sts., Cleveland 5, Ohio

**CHAPLETS**

Angell Nail & Chaplet Co., 4580 E. 71st St., Cleveland, Ohio.
Cleveland Chaplet & Mfg. Co., 1197 W. 67th St., Cleveland 2, O.
Combined Supply & Equipment Co., Inc., 215 Chandler St., Buffalo 7, N. Y.
Fanner Mfg. Co., Brookside Park, Cleveland 2, Ohio.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Service Co., Birmingham, Ala.
Milwaukee Chaplet & Mfg. Co., 1023 S. 40th St., Milwaukee 4, Wis.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24, Pa.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Frederic B. Stevens, Inc., Detroit 16, Mich.

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**CHARCOAL (Briquets)**

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**CHEMICALS**

Hercules Powder Co., Wilmington 99, Del.
Mathieson Chemical Corp., 60 E. 42nd St., New York 17, N. Y.

**CHEMISTS**

Crobaugh Co., Frank L., 1426 West Third St., Cleveland 13, Ohio.

**CHILLS**

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Angell Nail & Chaplet Co., 4580 E. 71st St., Cleveland, Ohio.
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Milwaukee Chaplet & Mfg. Co., 1023 So. 40th St., Milwaukee 4, Wis.
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**CHILL COATINGS**

Acheson Colloids Corp., Port Huron, Mich.
Thiem Products Co., 647 East Virginia St., Milwaukee 4, Wis.

**CHILL NAILS**

Angell Nail & Chaplet Co., 4580 E. 71st St., Cleveland, Ohio.
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**CHIPPERS—See PNEUMATIC TOOLS**

**CHISELS (Chipping)**

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Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.

**CLAMPS (Flask)**

Diamond Clamp & Flask Co., Richmond, Ind.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Sterling Wheelbarrow Co., 1700 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6160 Truscon Ave., Cleveland, Ohio.

**CLAMPS (Permanent Mold)**

Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.

**CLAY (Bonding)**

American Colloid Co., 363 W. Superior St., Chicago 10, Ill.
Carpenter Brothers, Inc., 606 West Wisconsin 3, Mo.
Baroid Sales Division, 830 Ducommun St., Los Angeles 12, Calif.
Eastern Clay Products, Inc., Jackson, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., Joliet, Ill.
Ironton Fire Brick Co., Ironton, O.

**CLAY (Refractory)**

Carpenter Brothers, Inc., 606 West Wisconsin 3, Mo.
Eastern Clay Products Inc., Jackson, O.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., Joliet, Ill.
Chas. Taylor Sons Co., Carew Tower, Cincinnati 2, Ohio

**CLAY STORAGE BINS**

Neff & Fry, Camden, O.

**CLEANING EQUIPMENT (Castings)**

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Pangborn Corp., Hagerstown, Md.

**CLUTCHES (Magnetic)**

Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.
Stearns Magnetic Mfg. Co., 622 S. 28th St., Milwuakee 4, Wis.

**COAL STORAGE BINS**

Neff & Fry, Camden, O.

**COKE (Foundry)**

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Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Pickands, Mather & Co., Cleveland 14, O.
Republic Coal & Coke Co., 8 So. Michigan Ave., Chicago 3, Ill.
Semet-Solvay Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.
Tennessee Products & Chemical Corp., American National Bank Bldg., Nashville 3, Tenn.

**COKE (Petroleum)**

Republic Coal and Coke Co., 8 S. Michigan Ave., Chicago 3, Ill.

**COLLECTORS (Dust)**

American Wheelabrator & Equipment Co., Mishawaka, Ind.
American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
Bartlett & Snow, C. O. Co., 6201 Harvard Ave., Cleveland, O.
Kirk & Blum Mfg. Co., Cincinnati 25, O.
Pangborn Corp., Hagerstown, Md.
Parsons Engineering Corp., 2545 E. 79th St., Cleveland 4, O.
Schneible Co., Claude B., 2827-25th St., Detroit 16, Mich.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.

**CONCRETE STORAGE BINS**

Neff & Fry Co., Camden, O.

**CONTROL SYSTEMS (Dust)**

American Air Filter Co., 223 Central Ave., Louisville, Ky.
American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.

**CONVERTER BLOWERS**

Roots-Connersville Blower Corp., Connersville, Ind.

**CONVERTERS (Bessemer)**

Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

**CONVEYOR DESIGN**

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Giffels & Valet, Inc., Marquette Bldg., Detroit, Mich.
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**CONVEYORS (Apron)**

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**CONVEYORS (Belt)**

Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Chain Belt Co., 1671 W. Bruce St., Milwaukee 4, Wis.
Imperial Belting Co., 1800 So. Kilbourn Ave., Chicago 23, Ill.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Joy Mfg. Co., Joy Division, Pittsburgh, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
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National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
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Joy Mfg. Co., Joy Division, Pittsburgh, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Standard Conveyor Co., North St. Paul 9, Minn.
Jervis B. Webb Co., 8951 Alpine, Detroit 4, Mich.

**CONVEYORS (Gravity)**

Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
Standard Conveyor Co., North St. Paul 9, Minn.

**CONVEYORS (Live Roller)**

Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Standard Conveyor Co., North St. Paul 9, Minn.

**CONVEYORS (Magnetic)**

Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

**CONVEYORS (Monorail)**

American Monorail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 E. 283rd St., Wickliffe, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Mathews Conveyor Co., 104 Tenth St., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Penn Iron Works, Reading, Pa.

**CONVEYORS (Overhead)**

Industrial Equipment Co., 315 N. Ada St., Chicago 7, Ill.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Jervis B. Webb Co., 8951 Alpine, Detroit 4, Mich.

**CONVEYORS (Pneumatic)**

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Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

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Standard Conveyor Co., North St. Paul 9, Minn.

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Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
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Federated Metals Div.,
American Smelting and Refining Co., 120 Broadway, New York 5, N.Y.
Niagara Falls Smelting & Refining Div., Continental - United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.
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Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Corn Products Sales Co., 17 Battery Pl., New York 4, N.Y.
Dayton Oil Co., Dayton 1, Ohio.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Hercules Powder Co., Wilmington 99, Del.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Chas. A. Krause Milling Co., S 43rd & Burnham St., Milwaukee, Wis.
National Starch Products Inc., 270 Madison Ave., New York 16, N.Y.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24, Pa.
Robeson Process Co., 500 Fifth Ave., New York 18, N. Y.
Superior Flake Graphite Co. 33 So. Clark St., Chicago 3, Ill.
Werner G. Smith Co., 2191 W. 110th St., Cleveland 2, O.
Swan-Finch Oil Corp., R.C.A. Bldg., West, New York 26, N. Y.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Thiem Products Co., 647 East Virginia St., Milwaukee 4, Wis.
Velsicol Corp., 330 E. Grand Ave., Chicago 11, Ill.

**CORE BLOWERS**

Martin Engineering Co., Kewanee, Ill.

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Wm. Demmler & Bros., Kewanee, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Service Co., Birmingham, Ala.
Harrison Machine Co., 2725 Station Rd., Wesleyville, Pa.
International Molding Machine Co., LaGrange Park, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.

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Diamond Clamp & Flask Co., Richmond, Ind.
Harrison Machine Co., 2725 Station Rd., Wesleyville, Pa.
Industrial Pattern Works, 2621 Belmont Ave., Chicago 18, Ill.
Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.

**CORE COMPOUND**

Bakelite Corp., 300 Madison Ave. New York 17, N. Y.
Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Dayton Oil Co., Dayton 1, Ohio.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Fordath Engineering Co. Ltd., West Bromwich, Birmingham, England
Werner G. Smith Co., 2191 W. 110th St., Cleveland 2, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Swan-Finch Oil Corp., R.C.A. Bldg., West, New York 26, N. Y.
Thiem Products Co., 647 East Virginia St., Milwaukee, Wis.
Velsicol Corp., 330 E. Grand Ave., Chicago 11, Ill.

**CORE CUTOFF & CONING MACHINES**

Wadsworth Equipment Co. 2457 Mogadore Rd., Akron, Ohio

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Freeman Supply Co., Toledo 5, O.
Newaygo Engineering Co., Newaygo, Mich.

**CORE GRINDERS (Power Operated)**

Jeffrey Mfg. Co., Columbus 16, O.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.

**CORE KNOCKOUT MACHINES**

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Pangborn Corp., Hagerstown, Md.
Simplicity Engineering Co., Durand, Mich.

**CORE MAKING MACHINES**

Champion Foundry & Machine Co., 1553 West Madison St., Chicago 7, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Wm. Demmler & Bros., Kewanee, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Fordath Engineering Co. Ltd., West Bromwich, Birmingham, England
Harrison Machine Co., 2725 Station Rd., Wesleyville, Pa.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., LaGrange Park, Ill.

**CORE MAKING MACHINES (Cont'd.)**

Milwaukee Foundry Equipment Co., 3228 W. Pierce St., Milwaukee 4, Wis.
Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.
Wadsworth Equipment Co. 2457 Mogadore Rd., Akron, Ohio

**CORE OILS**

American Red Star Co., 747 Beaubien St., Detroit 26, Mich.
Buckeye Products Co., 7022 Vine St., Cincinnati 16, Ohio.
Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Dayton Oil Co., Dayton 1, Ohio.
Delta Oil Products Co., Milwaukee 9, Wis.
Fordath Engineering Co. Ltd., West Bromwich, Birmingham, England
Foundry Service Co., Birmingham, Ala.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Werner G. Smith Co., 2191 W. 110th St., Cleveland 2, O.
Frederic B. Stevens, Inc., Detroit 26, Mich.
Swan-Finch Oil Corp., R.C.A. Bldg., West, New York 26, N. Y.
Thiem Products Co., 647 East Virginia St., Milwaukee, Wis.
Velsicol Corp., 330 E. Grand Ave., Chicago 11, Ill.

**CORE OVENS**

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, O
Despatch Oven Co., Minneapolis 14, Minn.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, O.
Kirk & Blum Mfg. Co., Cincinnati 25, O.
Lanly Company, 750 Prospect Ave., Cleveland 15, O.
Newcomb-Detroit Co., Inc., 5741 Russell St., Detroit 11, Mich.
Ross Engineering Corp., J. O., 350 Madison Ave., New York 17, N.Y.

**CORE PASTE**

Corn Products Sales Co., 17 Battery Pl., New York 4, N. Y.
Dayton Oil Co., Dayton 1, Ohio.
Delta Oil Products Co., Milwaukee 9, Wis.
Eastern Clay Products Co., Jackson, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Service Co., Birmingham, Ala.
Superior Flake Graphite Co. 33 So. Clark St., Chicago 3, Ill.
Thiem Products Co., 647 East Virginia St., Milwaukee, Wis.

**CORE PLATES (Steel, Asbestos)**

Black, Sivalls & Bryson, Inc., 720 Delaware, Kansas City 6, Mo.
Diamond Clamp & Flask Co., Richmond, Ind.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.
Johns-Manville, 22 E. 40th St., New York 16, N. Y.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.
Wadsworth Equipment Co. 2457 Mogadore Rd., Akron, Ohio

**CORE ROD STRAIGHTENING and CUTTING MACHINERY**

American Wheelabrator & Equipment Co., Mishawaka, Ind.

**CORE SAND**

Great Lakes Foundry Sand Co., United Artists Bldg., Detroit 26, Mich.
Standard Silica Corp., 209 So. LaSalle St., Chicago 4, Ill.
Wedron Silica Co., 38 So. Dearborn St., Chicago, Ill.

**CORE SAND MIXERS**

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
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Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Pioneer Mfg. Co., West Allis, Wis.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

**MOLDING MACHINES (Jolt)**

Adams Co., Dubuque, Iowa.
Arcade Manufacturing Div., Rockwell Mfg. Co., Freeport, Ill.
Champion Foundry & Machine Co., 1553 West Madison St., Chicago 7, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., LaGrange Park, Ill.
Johnston & Jennings Co., 867 Addison Rd., Cleveland 14, O.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.
Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

**MOLDING MACHINES (Jolt) (Cont'd.)**

S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.

**MOLDING MACHINE MOUNTING PADS**

Fabreeka Products, Inc., 222B Summer St., Boston, Mass.

**MOLDING MACHINE (Repairing)**

Standard Pattern Works, 13781 Concord, Detroit 12, Mich.

**MOLDING MACHINES (Rollover)**

Arcade Manufacturing Div., Rockwell Mfg. Co., Freeport, Ill.
Champion Foundry & Machine Co., 1553 West Madison St., Chicago 7, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., LaGrange Park, Ill.
Johnston & Jennings Co., 867 Addison Rd., Cleveland 14, O.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.
Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.

**MOLDING MACHINES (Squeeze)**

Adams Co., Dubuque, Iowa.
Arcade Manufacturing Div., Rockwell Mfg. Co., Freeport, Ill.
Champion Foundry & Machine Co., 1553 West Madison St., Chicago 7, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., LaGrange Park, Ill.
Johnston & Jennings Co., 867 Addison Rd., Cleveland 14, O.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.
Moline Iron Works, Moline, Ill.
Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.

**MOLDING SANDS**

Great Lakes Foundry Sand Co., United Artists Bldg., Detroit 26, Mich.
Standard Silica Corp., 209 So. LaSalle St., Chicago 4, Ill.
Wedron Silica Co., 38 So. Dearborn St., Chicago, Ill.

**MOLD WASH**

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
National Carbon Co., Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.
Superior Flake Graphite Co. 33 So. Clark St., Chicago 3, Ill.
Thiem Products Co., 647 East Virginia St., Milwaukee, Wis.
United States Graphite Co., Saginaw, Mich.

**MOLYBDENUM**

Molybdenum Corporation of America, Pittsburgh 19, Pa.

**MONORAIL SYSTEMS**

American Monorail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Industrial Equipment Co., 315 N. Ada St., Chicago 7, Ill.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Modern Equipment Co., Port Washington, Wis.

**MOTORS (Electric)**

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Ohio Electric Mfg. Co., 5906 Maurice Ave., Cleveland, Ohio

**MOUNTING PADS, MOLDING AND SHAKEOUT MACHINES**

Fabreeka Products, Inc., 22B Summer St., Boston, Mass.

**NAILS (Chill)**

Angell Nail & Chaplet Co., 4580 E. 71st St., Cleveland, Ohio.
Standard Horse Nail Corp., New Brighton, Pa.

**NICKEL**

International Nickel Co., Inc., 67 Wall St., New York City 5.

**NIPPLES (Air Line)**

U. S. Air Compressor Co., 5300 Harvard Ave., Cleveland 5, Ohio

**NITROGEN**

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.

**NOZZLES (Blasting)**

Alloy Metal Abrasives Co., 311 W. Huron St., Ann Arbor, Mich.
American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Davenport Machine & Foundry Co., Davenport, Iowa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Norton Co., Worcester 6, Mass.
Pangborn Corp., Hagerstown, Md.
George Pfaff Inc., 11-61 Jackson Ave., Long Island City, N. Y.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, O.

**OIL BURNERS**

Fisher Furnace Co., 2453 West Hubbard St., Chicago 12, Ill.
Hauck Manufacturing Co., 106 Tenth St., Brooklyn 15, N.Y.
Stroman Furnace & Engineering Co., Div. of Peterson Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

**OPEN HEARTH DOORS**

Wm. M. Bailey Co. Pittsburgh 16, Pa.

**OVENS (Annealing and Heat Treating)**

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Electric Furnace Co., Salem, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, O.
Lanly Company, 750 Prospect Ave., Cleveland 15, O.
Lindberg Engineering Co., 2450 West Hubbard, Chicago 12, Ill.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

**OVENS (Core) (See CORE OVENS)**

**OVENS (Enameling, Japanning)**

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.
Newcomb-Detroit Co., Inc., 5741 Russell St., Detroit 11, Mich.

**OVENS (Mold)**

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.
Newcomb-Detroit Co., Inc., 5741 Russell St., Detroit 11, Mich.

**OXYGEN**

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

**PAINT (Rust Proof)**

Speco Inc., 7308 Associate Ave., Cleveland, Ohio

**PARTING COMPOUNDS**

Buckeye Products Co., 7022 Vine St., Cincinnati 16, Ohio.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Frederic B. Stevens, Inc., Detroit 16, Mich.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Superior Flake Graphite Co., 33 S. Clark St., Chicago 3, Ill.
Tamms Silica Co., 228 N. LaSalle St., Chicago 1, Ill.
Thiem Products Co., 647 East Virginia St., Milwaukee, Wis.

**PATTERN ADHESIVES**

National Starch Products Inc., 270 Madison Ave., New York 16, N.Y.

**PATTERN BOARD STOCK**

Parkwood Corp., Wakefield, Mass.

**PATTERN COATINGS**

American Lacquer Solvents Co., Phoenixville, Pa.

**PATTERN COMPOUND**

Tamms Silica Co., 228 N. LaSalle St., Chicago 1, Ill.

**PATTERN LETTERS**

Freeman Supply Co., Toledo 5, O.

**PATTERN LUMBER**

Dougherty Lumber Co., Cleveland 5, O.
Freeman Supply Co., Toledo 5, O.

**PATTERN PLATES**

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.
Buffalo Pattern Works, 830 Hertel Ave., Buffalo, N. Y.
Central Pattern Co. Quincy, Ill.
City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit 11, Mich.
Foundry Service Co., Birmingham, Ala.
Freeman Supply Co., Toledo 5, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Industrial Pattern Works, 2621 Belmont Ave., Chicago 18, Ill.
Plaster Process Castings Co., 6922 Carnegie Ave., Cleveland 3.
Scientific Cast Products Corp., 1388-92 E. 40th St., Cleveland 3, O.

**PATTERN PLASTER**

United States Gypsum Co., 300 W. Adams St., Chicago, Ill.

**PATTERN PLATE STOCK**

Freeman Supply Co., 1152 Broadway, Toledo 5, O.

**PATTERN SHOP EQUIPMENT**

Buss Machine Works, 201 West 8th St., Holland, Mich.
Do All Company, Des Plaines, Ill.
Freeman Supply Co., 1152 East Broadway, Toledo 5, Ohio.
Oliver Machinery Company, Grand Rapids 2, Mich.
Skilsaw, Inc., 5000 N. Elston, Chicago 30, Ill.

**PATTERN SUPPLY HOUSES**

Freeman Supply Co., 1152 East Broadway, Toledo 5, Ohio.

**PATTERNS**

Industrial Pattern Works, 2621 Belmont Ave., Chicago 18, Ill.

**PATTERNS (PLASTIC)**

Central Pattern Co. Quincy, Ill.
Plastic Corp. of Chicago, 2444 So. Central Ave., Cicero 50, Ill.

**PATTERNS (Wood, Metal)**

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.
Buffalo Pattern Works, 830 Hertel Ave., Buffalo, N. Y.
Central Pattern Co. Quincy, Ill.
Champion Foundry & Machine Co., 1553 West Madison St., Chicago 7, Ill.
City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit 11, Mich.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Industrial Pattern Works, 2621 Belmont Ave., Chicago 18, Ill.
Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.
Pressure Cast Products Co., 1028 Vermont Ave., Detroit 16, Mich.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Wellman Bronze & Aluminum Co., 2525 E. 93rd St., Cleveland 4, O.

**PERMANENT MOLD COATINGS**

Acheson Colloids Corp., Port Huron, Mich.
Superior Flake Graphite Co. 33 So. Clark St., Chicago 3, Ill.

**PERMANENT MOLDS**

Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.
Rossborough Supply Co., 1456 W. 9th St., Cleveland 13, O.

**PHOTOGRAPHIC EQUIPMENT**

Eastman Kodak Co., Rochester, N. Y.
General Electric X-Ray Corp., 4855 Electric Ave., Milwaukee 14, Wis.

**PHOTOGRAPHY (Industrial)**

Eastman Kodak Co., Rochester, N. Y.

**PIG CASTING MACHINES**

Wm. M. Bailey Co. Pittsburgh 16, Pa.

**PIG IRON**

Globe Iron Co. Jackson, Ohio
Jackson Iron & Steel Co., Jackson, Ohio.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.
Pickands, Mather & Co., Cleveland 14, O.
Tennessee Products & Chemical Corp., American National Bank Bldg., Nashville 3, Tenn.
Woodward Iron Co., Woodward, Ala.

**PIG IRON (Silvery)**

Globe Iron Co. Jackson, Ohio
Jackson Iron & Steel Co., Jackson, O.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.

**PINS (Flask)**

Diamond Clamp & Flask Co., Richmond, Ind.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N.E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.
Universal Engineering Co., Frankenmuth, Mich.

**PISTON RINGS (for Molding Machines, Compressors, etc.)**

Nicholls, Wm., H., Co., Richmond Hill, Long Island 18, N. Y.

**PLANT ENGINEERING SERVICE**

Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.
Lester B. Knight & Associates, Inc., 600 West Jackson Blvd., Chicago 3, Ill.

**PLASTER OF PARIS**

United States Gypsum Co., 300 W. Adams St., Chicago, Ill.

**PLATES (Bottom)**

Adams Co., Dubuque, Iowa.
Diamond Clamp & Flask Co., Richmond, Ind.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

**PLATES (Core Drying)**

Champion Foundry & Machine Co., 1553 West Madison St., Chicago 7, Ill.
Diamond Clamp & Flask Co., Richmond, Ind.
Johns-Manville, 22 East 40th St., New York City 16.

**PLATING TEMPERATURE CONTROLS**

Foxboro Company, Foxboro, Mass.

**PLUMBAGO**

Bloomsbury Graphite Co., Bloomsbury, N. J.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Service Co., Birmingham, Ala.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Superior Flake Graphite Co., 33 S. Clark St., Chicago 3, Ill.
United States Graphite Co., Saginaw, Mich.

**PNEUMATIC TOOLS**

Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Texas.
Dayton Pneumatic Tool Co., Dayton 1, Ohio.
Gardner-Denver Co., Quincy, Ill.
Independent Pneumatic Tool Co., Aurora, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Joy Mfg. Co., Sullivan Division, Michigan City, Ind.
Master Pneumatic Tool Co., Inc., Orwell, Ohio.
Rotor Tool Co., 17325 Euclid Ave., Cleveland 12, Ohio.
Schramm Inc., West Chester, Pa.

**POURING DEVICES**

Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

**PRESSER BOARDS**

Adams Co., Dubuque, Iowa.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

**PRESSES (Hydraulic)**

Hydraulic Press Mfg. Co., Mount Gilead, Ohio

**PRESSURE CASTING SEALER**

Empire Varnish Co., 2636 E. 76th St., Cleveland 4, O.

**PRESSURE RECORDERS**

Foxboro Company, Foxboro, Mass.

**PROTECTIVE MATERIALS (X-Ray)**

General Electric X-Ray Corp., 4855 Electric Ave., Milwaukee 14, Wis.

**PULLEYS (Magnetic)**

Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

**PUMPS**

Construction Machinery Co., Waterloo, Iowa.
Gardner-Denver Co., Quincy, Ill.
Wayne Pump Co., 523 Tecumseh Ft. Wayne 4, Ind.

**PUMPS (Dry, Vacuum)**

Fuller Company, Catasauqua, Pa.
Roots-Connersville Blower Corp., Connersville, Ind.

**PURIFIERS**

Cleveland Flux Co., 1026 Main St., Cleveland 13, O.

**PUSH-OFF MACHINES**

Beardsley & Piper Co., 2424 N. Cicero, Chicago 39, Ill.
Champion Foundry & Machine Co., 1553 West Madison St., Chicago 7, Ill.
International Molding Machine Co., LaGrange Park, Ill.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.

**PUTTY (Foundry)**

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

**PYROMETERS**

Brown Instrument Co. Div. Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia 44, Pa.
Foxboro Company, Foxboro, Mass.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Illinois Testing Laboratories, Inc., 420 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 1, O.
Pyrometer Instrument Co., Bergenfield, N. J.
Tamms Silica Co., 228 N. LaSalle St., Chicago 1, Ill.

**PYROMETERS (Immersion)**

Pyrometer Instrument Co., Bergenfield, N. J.

**PYROMETERS (Optical)**

Pyrometer Instrument Co., Bergenfield, N. J.

**RACKS (Core Oven)**

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

**RADIOGRAPHY (Industrial)**

Eastman Kodak Co., Rochester, N. Y.
Radium Chemical Co., Inc., 570 Lexington Ave., New York 22, N. Y.
Tamms Silica Co., 228 N. LaSalle St., Chicago 1, Ill.

**RADIUM**

Radium Chemical Co., Inc., 570 Lexington Ave., New York 22, N. Y.

**RAMMERS**

Independent Pneumatic Tool Co., Aurora, Ill.

**RAPPING PLATES**

Diamond Clamp & Flask Co., Richmond, Ind.

**REFRACTORIES**

Babcock & Wilcox Co., 85 Liberty St., New York 6, N. Y.
Carborundum Co., Niagara Falls, N. Y.

**REFRACTORIES (Cont'd)**

Carborundum Co., Perth Amboy, N. J.
Cleveland Quarries Co., 1740 E. 12th St., Cleveland 14, O.
Eastern Clay Products, Inc. Jackson, O.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
A. P. Green Fire Brick Co., Mexico, Missouri
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Ironton Fire Brick Co., Ironton, O.
Keystone Refractories Co. 120 Liberty St., New York 6, N. Y.
Norton Co., Worcester 6, Mass.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24, Pa.
Robinson Clay Product Co., 1100 Second National Bldg., Akron, Ohio.
Chas. Taylor Sons Co., Carew Tower, Cincinnati 2, Ohio
United States Graphite Co., Saginaw, Mich.

**REPAIR PARTS (Molding Machine)**

Pioneer Mfg. Co., West Allis, Wis.

**RESPIRATORS**

Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.
Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa.
Wilson Products Inc., Reading, Pa.

**RIDDLES**

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

**RIDDLES (Electric)**

Champion Foundry & Machine Co. 1553 West Madison St., Chicago 7, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.
Great Western Mfg. Co., Leavenworth, Kans.
Roller Riddle Corp., P. O. Box 178, Port Huron, Mich.

**RIDDLES (Hand)**

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

**ROD DIP**

Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.

**ROD STRAIGHTENERS**

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

**RUBBER LINING MATERIAL (Abrasive Resisting)**

Pangborn Corp., Hagerstown, Md.

**RUST PROOF PAINT**

Speco Inc., 7308 Associate Ave., Cleveland, Ohio

**SAFETY CLOTHING**

American Optical Co., Southbridge, Mass.
Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.
C. Walker Jones Co., 6135 Lambert St., Philadelphia 38, Pa.
Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa.
Pangborn Corp., Hagerstown, Md.
Safety Clothing & Equipment Co. 7016 Euclid Ave., Cleveland 3, Ohio

**SALT and SALT TABLETS**

Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa.

**SAND (Core, Molding, Blasting)**

American Silica Sand Co., Ottawa, Ill.
Ayers Mineral Co. Zanesville, Ohio
Carpenter Brothers, Inc., 606 West Wisconsin, Milwaukee 3, Wis.
Great Lakes Foundry Sand Co., United Artists Bldg., Detroit 26, Mich.
Pangborn Corp., Hagerstown, Md.

**SAND (Core, Molding, Blasting) (Cont'd.)**

Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24, Pa.
Producers Core Sand Corp., Michigan City, Ind.
Standard Silica Corp., 209 So. LaSalle St., Chicago 4, Ill.
Wedron Silica Co., 38 So. Dearborn St., Chicago, Ill.

**SAND BLAST BARRELS**

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Pangborn Corp., Hagerstown, Md.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Sly Mfg. Co., W. W. 4753 Train Ave., Cleveland 2, O.

**SAND BLAST CABINETS**

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.

**SAND BLAST EQUIPMENT**

American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Pangborn Corp., Hagerstown, Md.
Tabor Mfg. Co., 6225 Tacomy St., Philadelphia 35, Pa.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.

**SAND BLAST NOZZLES**

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Norton Company, Worcester 6, Mass.
Pangborn Corp., Hagerstown, Md.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.

**SAND BLAST ROOMS**

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Pangborn Corp., Hagerstown, Md.
Sly Mfg. Co., W. W. 4753 Train Ave., Cleveland 2, O.

**SAND BLAST TABLES**

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.

**SAND BLAST CONDITIONERS**

Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.

**SAND CONDITIONING (Chemical)**

Johnson March Corp., 1724 Chestnut St., Philadelphia, Pa.

**SAND CONTROL & TESTING EQUIPMENT**

Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

**SAND CONVEYING and HANDLING EQUIPMENT**

American Air Filter Co., Louisville 8, Ky.
Ajax Flexible Coupling Co., Westfield, N. Y.
C. O. Bartlett & Snow Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Chain Belt Co., 1671 W. Bruce St., Milwaukee 4, Wis.
Clearfield Machine Co., Clearfield, Pa.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.

**SAND CONVEYING and HANDLING EQUIPMENT (Cont'd)**

Joy Mfg. Co., Joy Division, Pittsburgh, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Penn Iron Works, Reading, Pa.
Royer Foundry & Machine Co., Kingston, Pa.

**SAND CONVEYING and HANDLING EQUIPMENT (Pneumatic)**

Clark Industrial Truck Div. of Clark Equipment Co., Battle Creek, Mich.
Fuller Company, Catasauqua, Pa.
Frank G. Hough Co., Libertyville, Ill.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

**SAND COOLING SYSTEMS**

Newaygo Engineering Co., Newaygo, Mich.

**SAND DRYERS**

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Nichols Engineering & Research Corp., 60 Wall Tower, New York 5, N. Y.

**SANDERS (Pneumatic)**

Cleco Division of Reed Roller Bit Co., Houston, Texas.

**SANDERS (Tapered-Spindles)**

Wellman Products Co., 1444 E. 49th St., Cleveland 3, O.

**SANDING MACHINERY (Disc, Spindle, Belt, etc.)**

Freeman Supply Co., 1152 E. Broadway, Toledo 5, Ohio.
Oliver Machinery Company, Grand Rapids 2, Mich.

**SAND MEASURING and WEIGHING DEVICES**

Baker Perkins Inc., Saginaw, Mich.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

**SAND MIXERS**

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Baker Perkins Inc., Saginaw, Mich.
Beardsley & Piper Co., The, 2424 N. Cicero, Chicago 39, Ill.
Blystone Division, Standard Sand & Machine Co., 549 W. Washington Blvd., Chicago 6, Ill.
Clearfield Machine Co., Clearfield, Pa.
Construction Machinery Corp., Waterloo, Iowa.
Freeman Supply Co., 1152 E. Broadway, Toledo 5, Ohio.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Posey Iron Works Inc. Lancaster, Pa.
Royer Foundry & Machine Co., Kingston, Pa.

**SAND PREPARATION EQUIPMENT**

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
Ajax Flexible Coupling Co., Westfield, N. Y.
Baker Perkins Inc., Saginaw, Mich.
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.

**SAND PREPARATION EQUIPMENT (Cont'd.)**

Beardsley & Piper Co., The, 2424 N. Cicero, Chicago 39, Ill.
Clearfield Machine Co., Clearfield, Pa.
Fordath Engineering Co. Ltd., West Bromwich, Birmingham, England
Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Jeffrey Mfg. Co. 907-99 N. Fourth St., Columbus 16, O.
Moulders Friend, Dallas City, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Posey Iron Works Inc. Lancaster, Pa.
Royer Foundry & Machine Co., Kingston, Pa.
Sather Mfg. Co., Everett, Wash.
Simplicity Engineering Co., Durand, Mich.

**SAND RAMMERS**

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Texas
Dayton Pneumatic Tool Co., Dayton 1, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Master Pneumatic Tool Co., Inc. Orwell, Ohio
Rotor Tool Co., 17325 Euclid Ave., Cleveland 12, Ohio.

**SAND RECLAIMERS**

Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Nichols Engineering & Research Corp., 60 Wall Tower, New York 5, N. Y.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

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Specialized in cupola operation, gating, sand and quality control, foundry mechanization. Have reduced scrap and increased production in a number of plants. College graduate. Address: Box 511, The FOUNDRY, Cleveland 13, Ohio.

**PERMANENT MOLD CONSULTANT**

Complete service on the phases of permanent molding from estimating on customers' prints to the building of production running molds. Experts on making molds run and setting up permanent mold foundries. Address: Box 504, The FOUNDRY, Cleveland 13, Ohio.

**SUPERINTENDENT**

Over thirty years' practical experience molder to manager, ferrous and nonferrous. Good rigger and well versed in core blowing and sand-slinger. Cost conscious. Now located Southwest. Will go anywhere. Address: Box 508, The FOUNDRY, Cleveland 13, Ohio.

**FOUNDRY OWNERS—NOTE**

Do you have an unprofitable operation? Then communicate with an experienced operator with a reputation for taking foundries out of the red—37 years of age—19 years' practical and managerial experience in production and jobbing making castings up to 20 tons each. Experienced in labor relations, contracts, finances, purchasing and in shops employing 200 to 500 men. Educated in industrial engineering and plant management. Excellent references. Address: 480, The FOUNDRY, Cleveland 13, Ohio.

**MANAGER—SUPERINTENDENT**

Experienced grey iron jobbing production, soil pipe and fittings, steam and drainage. McClain graduate mixing and melting. Produce machinable iron without pig. Well versed all operations. Desire position Eastern states. Address: Box 503, The FOUNDRY, Cleveland 13, Ohio.

**FOREMAN OR SUPERINTENDENT**

Desires position in gray iron foundry. Twenty-three years' experience, practical man, jobbing or production—also soil pipe and fittings. Address: Box 502, The FOUNDRY, Cleveland 13, Ohio.

## Positions Wanted

**PATTERN FOREMAN**

Capable, experienced, good estimator and instructor, 20 years as foreman, thorough knowledge of foundry practice, desires change. Prefer New England or New York state but would consider anywhere. Address: Box 486, The FOUNDRY, Cleveland 13, Ohio.

**MELTING FOREMAN**

Metallurgical and chemical training. 15 years experience cupola and electric furnace supervision. Iron made to exact chemical and physical specifications. Cost minded. Age 36. Address: Box 491, The FOUNDRY, Cleveland 13, Ohio.

**ELECTRIC MELTING FOREMAN**

Eighteen years' experience on acid and basic iron and steel including all alloys for static or centrifugal castings. Desires connection with reliable firm. Now employed. Age 36. Best of references. Address: Box 505, The FOUNDRY, Cleveland 13, Ohio.

**COREROOM SUPERINTENDENT**

20 years' experience specializing in sand control blowing machines, jobbing and production. Experienced in all kinds of coremaking, baking, fitting, assembling and pattern shops. Address: Box 479, The FOUNDRY, Cleveland 13, Ohio.

**FOUNDRY SUPERVISOR**

Qualified and experienced supervisor desires connection with progressive company. Eighteen years of practical foundry experience—ten years as general foreman and foundry superintendent. Thirty-nine years of age, married. Good references. Address: Box 509, The FOUNDRY, Cleveland 13, Ohio.

**MOLDER**

With 20 years' experience. Desires work in Detroit area. Prefer nonferrous production and jobbing shop. Address: Box 512, The FOUNDRY, Cleveland 13, Ohio.

**AVAILABLE**

Sales representative thoroughly experienced in castings with active accounts in Ohio, Pennsylvania, Indiana. Age 35, married, college educated. Desires permanent connection. Address: Box 510, The FOUNDRY, Cleveland 13, Ohio.

**FOUNDRY EXECUTIVE**

A graduate engineer with 20 years' experience as superintendent and plant manager desires permanent position. Wide knowledge of high production and jobbing of pressure and machine tool castings from gray iron and nonferrous metals. Address: Box 463, The FOUNDRY, Cleveland 13, Ohio.

**FOUNDRY MANAGER**

TOP FLIGHT FOUNDRY MANAGER AVAILABLE. EXPERIENCED IN ALL PHASES OF THE MODERN GRAY IRON FOUNDRY. MEEHANITE EXPERIENCE, TECHNICAL TRAINING, RESEARCH WORK, DEVELOPMENT AND SALES AND CUSTOMER CONTACT. THIRTY YEARS' EXPERIENCE. ADDRESS: BOX 477, THE FOUNDRY, CLEVELAND 13, OHIO.

**FOUNDRY SUPERINTENDENT**

Twenty-two years in machine tool foundries and others requiring cast iron of similar high quality. Superintendent and assistant for five years. Age 39. Now employed. Address: Box 442, The FOUNDRY, Cleveland 13, Ohio.

**FOUNDRY ENGINEER OR ASSISTANT EXECUTIVE**

Engineering degree—Illinois Engineering license. Five years' general foundry experience covering mechanization programs, foundry maintenance, melting and metallurgy. 2½ years' naval engineer. Married, age 29. Desire responsible permanent position with future opportunities. Address: Box 517, The FOUNDRY, Cleveland 13, Ohio.

# Classified Advertising

## Positions Wanted

**PATTERNSHOP**

Why not have your patternshop pay its own costs and show a profit. Fast and experienced wood and metal patternmaker, foreman of larger shop or working foreman in small shop. Capable of estimating work layout from drawing to making patterns small or large and checking patterns and castings. Foundry experience in pattern mountings, gates and core box driers. Can teach apprentices fastest methods enabling rapid advancement. Address: Box 473, The FOUNDRY, Cleveland 13, Ohio.

**PERMANENT MOLD FOUNDRY ENGINEER**

Now engaged in producing permanent molds desires connection with nonferrous foundry now producing or contemplating the production of permanent mold castings. Familiar with both the metallurgical and mechanical problems of permanent molding, aluminum, magnesium and bronze. Can design and supervise construction of molds also operate or instruct others in operation of molds. Able to take complete charge of permanent mold foundry. Full or part time. Address: Box 476, The FOUNDRY, Cleveland 13, Ohio.

**ALUMINUM AND MAGNESIUM PERMANENT MOLD FOUNDRY ENGINEER**

EXPERIENCED AIRCRAFT PARTS OR ANY INTRICATE WORK. FULL OR PART TIME. PREFERRED LOCATION NEW JERSEY OR NEW YORK. ADDRESS: **ARTHUR JOLINE, 58 ELMWOOD DRIVE, EAST PATERSON, NEW JERSEY.**

**GENERAL MANAGER**

Mature, profit-minded, dependable. Has successfully managed four companies—two taken out of the red. Available for service shortly with medium-size company requiring reliable directing ability in management, sales finance and production. Excellent experience, foundry, machine and related lines. Address: Box 871, The FOUNDRY, Cleveland 13, Ohio.

**WEIGHT ESTIMATING**

Estimating of casting weights furnished by return mail. Accurate, reliable and confidential service. Nominal fee. Send blueprints to: CHARLES E. ROLAND, 215 FOREST DRIVE, ITASCA, ILL.

**METALLURGIST**

B.S. degree, good practical steelmaking experience in acid electric. Experienced in sand testing and radiography and laboratory work. Also experienced in melting of grey iron in the electric furnace and in the cupola with a good knowledge of cupola operation. Now employed but desire position with better opportunity. Prefer midwest, but location is of secondary importance. Address: Box 465, The FOUNDRY, Cleveland 13, Ohio.

**FOREMAN NONFERROUS FOUNDRY**

Practical molder and foundryman experienced with steam valves, art bronze, production and jobbing work. Want position with manufacturing plant. Chicago district only. Address: Box 506, The FOUNDRY, Cleveland 13, Ohio.

**FOREMAN**

Can take full charge of small or medium size gray iron foundry. Western states preferred. Address: Box 431, The FOUNDRY, Cleveland 13, Ohio.

## Pattern Work Wanted

Modern pattern shop, Cleveland area. Can take wood and metal first class work. Let us quote from your prints. Address: Box 516, The FOUNDRY, Cleveland 13, Ohio.

## Accounts Wanted

**INDUSTRIAL SALES REPRESENTATION**

Throughout Western Pennsylvania, West Virginia and Eastern Ohio offered to reliable manufacturers, including castings and forgings. Our salesmen are efficient, aggressive and fully cover territory outlined. Address: Box 455, The FOUNDRY, Cleveland 13, Ohio.

## Accounts Wanted

**MANUFACTURERS PLEASE NOTE:**

CAN YOU USE PROVEN SALES ABILITY TO PROMOTE YOUR INTERESTS AND EXPAND BUSINESS IN CLEVELAND AND NORTHEASTERN OHIO?

Experienced representation now active with established contacts desires additional product to sell. Will merchandise your advertising and sales programs in manner equivalent to your own salaried staff operating on straight commission basis in return for exclusive territorial arrangement.

**BOX 495**
**THE FOUNDRY CLEVELAND 13, OHIO**

## Contract Work Wanted

Thirty years specializing in moving brick, core and mold ovens to new sites. Remodeling and repairing, combustion chambers rebuilt and modernized.

**H. WESTHEAD & SON**
**5383 SUMMIT RD. LINDHURST, OHIO**

## Open Capacity

**ALUMINUM CASTINGS**

Open capacity squeezer production. Matchplate and working patterns. Alloys, high tensile and high impact strength. Address: BERLIN FOUNDRY INC., BERLIN, CONN.

**OPEN CAPACITY**

**Gray iron and aluminum castings. Specialize in gas burners and thin section castings. Address: INDUSTRIAL FOUNDRY & MFG. CO., SCHOOLCRAFT, MICHIGAN.**

**OPEN CAPACITY**

Moved into our new modern foundry. Have open capacity for light and medium gray iron, brass, bronze and aluminum castings. Address: O.K. FOUNDRY CO., 1005 E. 9th Street Road, Richmond, Va.

**AVAILABLE CAPACITY**

**Our foundry has open capacity to supply small and medium size gray iron castings. Send sample. Address: OREGON CASTINGS CO., RD 3, Lititz, Pa.**

## Opportunities

**COKE SAVINGS OF DOLLARS**

per day is possible in nearly every foundry—reduction of total time of heat—resulting in quality metal. Get our report on your cupola. Semisteel is the purest—strongest—hottest metal made in cupola. Are you making it? Our system is an investment that brings returns worth many times the fee. Distance is no bar and remember you don't wade thru hundreds of pages only to learn the information has no bearing on the making of quality castings or how to keep your losses down. Advice is concise and a real treat for every man connected with the foundry. Information free.

**McLAIN'S SYSTEM INC.**
**236 E. NORTH AVE. MILWAUKEE, WIS.**

## Open Capacity

**OPPORTUNITY**

**We can furnish at any point slack, fibre and tight barrels; also fibre and steel drums. Address: BUCKEYE COOPERAGE COMPANY, 3807 ORANGE AVENUE, CLEVELAND 15, OHIO.**

## Employment Service

**SALARIED POSITIONS**

**$3,500—$35,000**

**If you are considering a new connection communicate with the undersigned. We offer the original personal employment service (39 years recognized standing and reputation). The procedure, of highest ethical standards, is individualized to your personal requirements and develops overtures without initiative on your part. Your identity covered and present position protected. Send only name and address for details.**

**R. W. BIXBY, INC.**
**101 DUN BLDG. BUFFALO 2, N. Y.**

**SALARIED PERSONNEL**

**$3,000—$25,000. This reliable service, established 1927, conducts confidential negotiations for high-grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, 241 ORANGE STREET, NEW HAVEN 10, CONN.**

**EMPLOYERS**
**SERVICE BUREAU**
**A SUPERIOR PERSONNEL SERVICE**
**FOR DISCRIMINATING**
**EMPLOYERS**
**ESTABLISHED 1922**

Specializing in thorough screening of qualified personnel for any phase of foundry operations.

APPLICANTS

If you can furnish QUALIFIED references attesting to your CAPABILITY and DEPENDABILITY, your application will be accepted and we will secure for you the desired position, without cost. Our service is 100% FREE to applicant.

IMMEDIATE OPENINGS
Partial Listing
SUPERINTENDENTS
ASS'T. SUP'TS.
GENERAL FOREMEN
CORE ROOM FOREMEN
MELTING FOREMEN
MOLDER FOREMEN
CLEANING ROOM FOREMEN
CUPOLA SUPERVISORS
SR. INDUSTRIAL ENGINEERS
JR. INDUSTRIAL ENGINEERS
TIME STUDY ENGINEERS
MASTER MECHANICS
PLANT ENGINEERS
MAINTENANCE SUP'TS.
MAINTENANCE FOREMEN
LABOR FOREMEN
METALLURGISTS
CHEMICAL ENGINEERS
CHEMISTS
PRODUCTION CONTROL
SALES ENGINEERS
ACCOUNTANTS

If you are experienced in any phase of foundry operations—and desire to improve your future working conditions:

**WRITE**
**EMPLOYERS SERVICE BUREAU**
**33 WEST WASHINGTON ST.**
**CHICAGO 2, ILL.**
**TELEPHONE: FINANCIAL 6-1155**

## Foundries For Sale

**GRAY IRON FOUNDRY**

10,000 square feet—2 acre tract—rail facilities—located Midwestern town. Experienced help plentiful. Air equipped. Ten moulders, jolt squeezers, rollovers, ample core oven capacity, core blower, core sand mixer, wheelabrator, rattlers, Hammond grinders, Whiting cupola, Roots blower and backlog of orders. Money maker. Address: Box 507, The FOUNDRY, Cleveland 13, Ohio.

# Classified Advertising

## Foundries For Sale

**INVESTMENT OPPORTUNITY**
**MODERN CAST STEEL FOUNDRY**
**AND**
**MACHINE SHOP**

CONTROL OR MAJOR INTEREST IN Modern Manufacturing Plant located in East Texas is available at less than liquidated value.

Foundry equipped with electric steel furnaces and all modern equipment for production of 200 tons or more of carbon and alloy steel castings per month.

Machine shop will inventory finest machine tools for production of oil field and refinery equipment, road building equipment, farm and agricultural machinery, and rough steel castings or steel castings machined complete.

Entire plant covers 50,000 sq. ft. floor space. Excellent labor relations.

$100,000.00 required. Attractive deferred payment plan can be arranged with acceptable responsible principals. Now operating at a 10% profit.

**SOLLBERGER ENGINEERING CO., INC.**

**510 HAZELWOOD ST.** **MARSHALL, TEXAS**

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**FOR SALE**

Prominent

BRASS FOUNDRY

and

MACHINE PLANT

located in Connecticut

For further details write

**BOX 1642**

**1471 BROADWAY** **NEW YORK 13, N. Y.**

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**FOUNDRIES FOR SALE**

In medium sized industrial city, Birmingham area, foundry in operation. Within corporate and switching limits. On Southern Railway with several major truck lines. Fire proof all steel building, modern construction, cement floors 100 x 260 feet, excellent site 450 feet square. Adapted for any industrial purpose with electric motors, natural gas, filtered water, facilities, taxes and insurance rates most favorable.

Excellent labor and young experienced personnell now employed. Room for extensive plant in any mechanical group. Will consider sale exclusive of equipment now in use.

Bargain for purchaser seeking increased production or division of product now being made. Prompt reply with photos to those having real interest.

**BOX 439**

**THE FOUNDRY** **CLEVELAND 13, OHIO**

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**FOR SALE OR LEASE**

**Completely equipped gray iron foundry immediately available. Western Pennsylvania, Pittsburgh district. Two cupolas, one No. 7 Whiting, one 36" colleau. Positive pressure blowers, four 5ly tumbling barrels, Pangborn sand blast room, Pangborn sand blast barrel. Natural gas available. Pattern shop with wood-working power tools. Sheet metal shop with equipment. Address: Box 410, The FOUNDRY, Cleveland 13, Ohio.**

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**SMALL GRAY IRON FOUNDRY**

Near Canton, Ohio. 24" cupola, 4 squeezers, rollover, pattern draw, core blowers, wheelabrator, pig and scrap. Address: Box 420, The FOUNDRY, Cleveland 13, Ohio.

## Wanted-To-Buy

**WANTED**

Square rumbler for tumbling pipe specials. Will have to be about 48 inches. Address: THOMPSON FOUNDRY & MACHINE COMPANY.

## Wanted-To-Buy

**PATTERNSHOP**

Interested in buying patternshop or part interest. Experienced patternmaker in wood and metal, matchplate and precision casting. Can make shop pay profit. Address: Box 472, The FOUNDRY, Cleveland 13, Ohio.

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**WANTED**
**PIPE FITTING PATTERNS**

We are going into the pipe fitting casting business and are interested in buying pipe fitting patterns of any type or kind. Address: Box 488, The FOUNDRY, Cleveland 13, Ohio.

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**WANTED**
**COCK GRINDER**

New or used—single or multiple spindle—⅛" to 1½" I.P.S. State fully, condition and price.

**BOX 497**

**THE FOUNDRY** **CLEVELAND 13, OHIO**

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**MIXER WANTED**

No. 2 Simpson intensive sand muller, late model preferred. State condition, price and power characteristics. Address: Box 475, The FOUNDRY, Cleveland 13, Ohio.

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**WANTED**

Cast iron floor or cesspool drains and valve boxes. Address: Box 513, The FOUNDRY, Cleveland 13, Ohio.

## Wanted-To-Buy

**MOLDING MACHINE WANTED**

**Rollover type 1500# capacity—to suit flask 30" diam 25" high—20" draw. Address: Box 451, The FOUNDRY, Cleveland 13, Ohio.**

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**WANTED**

One induction furnace, lab. type, 15 to 25 lbs. capacity. Address: Box 492, The FOUNDRY, Cleveland 13, Ohio.

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**WANTED**

One electric arc furnace, rated capacity approximately ½ ton per hour, complete with shell, tilting mechanism, control and transformer. Address: Box 493, The FOUNDRY, Cleveland 13, Ohio.

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**WANTED TO BUY**

1—good small used Brinell testing machine. Address: MIDSTATE FOUNDRY CO., CHARLESTON, ILL.

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**MIXERS WANTED**

**Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address Box 578, The FOUNDRY, Cleveland 13, Ohio.**

## For Sale

**FOR SALE**

#44-48 Hollingsworth wheelabrator, complete. Address: PERU FOUNDRY CO., PERU, INDIANA.

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**FOR SALE**

| | Special Price |
|---|---|
| 9 kegs #5—1-15/16" Union Chill Nails.. | $0.10 lb |
| 33 kegs #6—2-1/8" Union Chill Nails... | .12 lb |
| 21 kegs #8—2-17/32" Union Chill Nails.. | .12 lb |
| 7 kegs #9—2-11/16" Union Chill Nails.. | .12 lb |
| 5 kegs #10—2-27/32" Union Chill Nails. | .12 lb |
| 16 kegs 2-1/8" MOLDOCHIL—Large Head—Reg. Blade ..... | .10 lb |

OFFERED SUBJECT TO STOCK ON HAND

**JOHN PRITZLAFF HARDWARE CO.**

**MILWAUKEE** **WISCONSIN**

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**FOR SALE**

2—23" taper covered ladle with model "C" gearing and V type bail. C-48061, C-48062 manufactured by Modern Equipment Co. at $378.00 each, less 25%, FOB Elgin, Illinois. Address: **WOODRUFF & EDWARDS, INC., ELGIN, ILL.**

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**FOR SALE**

12—OSBORN ROLLOVER JOLT MOULDING MACHINES.

Stationary, model 2047-1. Flask space 22½" x 21½" draw 11½".

These machines are like new and are priced for a quick sale at $175.00 each. Original cost $2400.00 each, weight 3500 lbs. each.

**CANTON INDUSTRIAL SALVAGE CO.**

**325 ELEVENTH ST. S.E.** **CANTON, OHIO**

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**SURPLUS EQUIPMENT**

1—CHAMPION CB-100 CORE BLOWER, almost new with electrical equipment, processed and skidded for immediate shipment

1—St. REGIS 181 FV FIRE EXTINGUISHER, for magnesium, used, good condition.

6—PUMPS AND TANKS FOR VARSOL CLEANING OR COOLANT USE. Electric motor, switch and float, brand new.
ALL ABOVE AC, 3-phase, 60 cycle, 220-440 Volt

6—No. 200 LAVA CRUCIBLES

12—No. 100 LAVA CRUCIBLES

**ADDRESS UNIONWORTH INC.**
**CENTRAL FOUNDRY BUILDING**
**FT. PACIFIC STREET**
**NEWARK, N. J.**
**PHONE: BIGELOW 3-4002**

# Classified Advertising

## For Sale

**FOR SALE**

WELDING POSITIONER — Ransome #16, 16000# Capacity. Table rotates and tilts under power, 220/440 motor driven, push button controls. Motor driven Model #6T Tailstocks. Serial #5509. TWO AVAILABLE FOR IMMEDIATE DELIVERY.

VIBRATING SCREEN — Tyler - Niagara Type #300. Serial #8733". Size—72" x 48". V-belted motor drive. Complete with gear reducers, sheaves, and Jeffrey Belt Conveyor Bucket Type Elevator.

SAND MIXER OR MULLER—Clearfield #610. Serial #225-C. NEW IN 1944. 72" dia. pan. Capacity for charge—10-14 cu. ft. Motor driven w/15 h.p. 220/440 volts motor. Complete with motor driven hoist.

JOLT SQUEEZE PATTERN DRAW MOLDING MACHINES—Johnson & Jennings. NEW IN 1943. Table size—15" x 21". Head Platen size—12" x 8".

HAND ROLLOVER POWER DRAW MOLDING MACHINE—SPO. Complete with run out car. Size inside frame—22½" x 72".

**FALK MILL SUPPLY CO., INC.**
**18 WARD ST.**
**ROCHESTER 5, N. Y.**

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**FOR SALE**
**FOUNDRY EQUIPMENT**

1—Osborne Core Blower, No. 193
1—Demmler Core Blower, Style 3-E
1—Osborne Core Box Drawing Machine #146
Molding Machines—Herman R. O. 1500 lb. Cap.
International 24" x 30" Type G—
Osborne Jolt Squeezers, various sizes
3—2-ton Ingersoll Air Hoists

**RAY P. SCULLY**
**SCULLY MACHINERY & EQUIPMENT CO., NOT INC.**
**767 MILWAUKEE AVE. CHICAGO 22, ILL.**
**PHONE: CANAL 6-0314**

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**FOR SALE**

SAND MIXER

Model 920 Clearfield, 9' dia., 20 to 25 Cu. Ft. capacity with No. 3 bucket type loader and electrical equipment Serial No. 193C, new in 1941.

TUMBLERS

7 and 14 Cu. Ft. Pangborn "Rotoblast" barrels each with hopper, dust collector and electrical equipment. New in 1942 and 1943.
Globe and Hartford octagonal barrels.

MOLDING MACHINE

No. 193-4 Milwaukee jolt, squeeze, strip. Serial No. 11794, new in 1942.

FURNACES

No. 690 M Campbell Hausfeld tilting type for brass or aluminum. Gas fired.
4—No. 80, type S, Fisher pit type for brass or aluminum. New about 1941 or 1942.

BLOWERS

Many sizes of pressure blowers and exhausters. Send your inquiry.

**MILLS MACHINERY CO.**
**SAGINAW, MICH.**

---

**FOR SALE**

Used Universal tensile testing machine. Good condition. Type MP-10, motor driven, hydraulically operated. Price $2,000.00. Address: MIDWEST FOUNDRY INC., 1534 SOUTH MEAD, WICHITA, KANSAS.

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**FOR SALE**

Whiting inclined skip hoist side dump charging unit. Excellent condition—2 years old. Suitable for No. 6, 7 and 8 Cupolas. Hoisting speed 55 FPM. Spare hoisting drum with 5 HP motor 220 V—3 ph—60 cy. Dismantled and ready for immediate shipment. Complete with relays and automatic controls. $3200.

**WELLS MANUFACTURING CO.**
**7800 NORTH AUSTIN AVE. SKOKIE, ILL.**
**(CHICAGO SUBURB)**

## For Sale

**FOR SALE**

NEW ROLLER CONVEYOR (Never Used)

Eight 10 ft. straight sections—rollers 20" long by 1.9" diameter spaced on 4" centers complete with 18 supports 8" high. Grease sealed bearings for foundry use.

Our cost $508.00. Will sell for $290.00.

**A. L. SWETT IRON WORKS—MEDINA, N. Y.**

---

**EQUIPMENT FOR SALE**

3—30" x 72" and x 96" long
3—48" x 72" and x 84" long

Whiting tumbling barrels—belt driven. Complete in every respect.

**FAIRBANKS, MORSE & CO.**
**ST. JOHNSBURY, VERMONT**

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**FOR SALE**

5 ton Whiting powdered coal fired holding furnace.
2 #193 Milwaukee jolt squeeze strip molding machines.
2 Hausfeld and 4 Monarch Aluminum melting furnaces, type "NP", serial numbers 538, 541, 542 and 533.

**NYLEN PRODUCTS CO.**
**ST. JOSEPH, MICHIGAN**

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**MACHINERY FOR SALE**

Air compressor, Ingersoll Rand, 2 stage, 100 HP, 400 CFM. Water cooled with after cooler and all electric wiring. Now running. $2975 f.o.b. our plant.

Also 10 HP Briggs water cooled air compressor, $385.

**INTERNATIONAL BEARING CORP.**
**3369 GRATIOT AVENUE**
**DETROIT 7, MICH.**

---

**FOR SALE**

One 36 x 42 American Wheelabrator tumblast complete with electrical equipment for 220 volt, 60 cycle, 3 phase current. Also one dust arrestor for above.

**MODERN DROP FORGE CO.**
**133th ST. & WESTERN AVE.**
**BLUE ISLAND, ILL.**
**TELEPHONE PULLMAN 5-2680**

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**FOR SALE**

One brand new model AS vertical centrifugal casting machine, 5 H.P., driving unit with speed range of 0-600 R.P.M. for operation on 220 volt, 60 cycle, 3 phase power, complete with control cabinet. If interested please reply—

**BOX 435**
**The FOUNDRY CLEVELAND 13, OHIO**

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**FOR SALE**

SAND HANDLING SYSTEM

Complete mechanized overhead sand handling system consisting of 19 individual moulders' hoppers, Beardsley & Piper Speed Mullor Model #50, Royer Magnetic separator, Jeffrey Pallet Conveyor #24 consisting of 360 feet of track and 59 cars, together with motors, conveyor belts and other parts pertaining to system.

PRICE $16,500.00 AT PLANT

**OLD COLONY FOUNDRY COMPANY**
**EAST BRIDGEWATER, MASSACHUSETTS**

---

**FOR SALE**
GOOD CONDITION

10—Adams jolt squeeze machines 10-32" portable side rod type.
1—Beardsley-Piper heavy duty portable sand conditioner with magnetic pulley and screen. 60 tons per hour capacity, complete with motors and generator.

**NEENAH FOUNDRY COMPANY**
**NEENAH WISCONSIN**

## For Sale

**FOR SALE**

PRACTICALLY NEW EQUIPMENT USED LESS THAN THREE MONTHS

One—Type ADC-1000 Aluminum Holding Furnace, Serial 4852, Gas Fired Complete with 1000 Lb. capacity crucible—Fisher F-20 Blower, Serial 2579-B, 220 volts, 3 phase, 60 cycles—Motorized air valve 110 volts, 60 cycles.

**REED METAL CRAFTS**
**3536 N. KNOX AVENUE**
**CHICAGO 41, ILLINOIS**

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**FOR SALE**

AJAX INDUCTION HEAT FURNACE for melting or holding—capacity 300 pounds—100 KW, 240 Volt, 960 cycle, tilting device and hydraulic pump, micromax controller and Ray-o-tube, cubicle with switch gear 250-115V, 500 VA transformer.

WESTINGHOUSE ELECTRIC FURNACE TRANSFORMER, 1800 KVA, 13,800 Volts, 55°, 60 cycle, 440 Volts 3 phase, water cooled, motor operated tap changer.

TWO DETROIT ELECTRIC ROCKING TYPE C C melting furnaces, capacity 3000 pounds, with 4600 Volt transformers, extra shell and spare parts for furnaces.

**KELSEY-HAYES WHEEL COMPANY**
**3600 MILITARY AVENUE**
**DETROIT 32, MICHIGAN.**
**A. FRAZHO**

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**FOR SALE**

1 New Ferguson horizontal belt conveyor, stationary type, 24" wide, 24' long, 34" high, 30 FRM; Cost $1,100, will sell $750.
1 Long belt portable conveyor; Cost $990 with motor, will sell $500.
1 Beardsley-Piper Speedmullor, No. 30, with blower and skip hoist and motors; Cost $6,000, will sell $4,000.
1 Demmler No. 2E core blower, new; Cost $1,625, will sell $1,200.
9 Moline hand squeezers; Cost $225 each, will sell $100 each.
2 Milwaukee Jolt Squeeze, model 103; Cost $500 each, will sell $150 each.
3 Adams Jolt Squeeze, No. 2; Cost $300 each, will sell $150 each.

**WESTERN FOUNDRY COMPANY**
**BOX 878**
**TYLER, TEXAS**

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**FOR SALE**

10—Fisher type HNP-275 hydraulically tilted gas fired (2-burner) crucible melting furnaces, lined to accommodate #225 crucibles; complete with proportional mixing valve equipment; including five 7½ HP 16 oz. blower units with motors, 3 phase, 60 cycle; hydraulic system consists of 7½ HP pump arrangement permitting tilting of 3 furnaces at any one time; stand-by hydraulic pump unit also included.

1—Castings conveyor 72" wide by 42' long complete with frame and motors.

**BOX 484**
**THE FOUNDRY CLEVELAND 13, OHIO**

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**FOR SALE**

1—American Foundry Equipment sand cutter. Completely overhauled. Gasoline motor driven. Will straddle sand pile 72" wide. Address: OHIO MALLEABLE IRON CO., COLUMBUS, OHIO.

# Classified Advertising

## For Sale

### EQUIPMENT FOR SALE

MOLDING MACHINES
3—75J Osborn Jolt Squeeze.
2—SPO #611-B Stationary, Oscillating, Jolt, Squeeze Strippers
1—SPO #4½ JHS Air Jolt Hand Strip
1—Tabor Plain Squeeze, Strain Rod Type
3—Mumford 3" Cyl. Core Jolt, with 20" x 15" Table
4—Osborn #36 core box drawing machines.

BLOWERS FOR CUPOLAS AND FURNACES
2—Spencer Turbine Cupola blowers 4100 CFM 16-oz. 25 HP direct connected motor
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1—Connersville double geared rotary cupola blower, rated 24 cu. ft. per rev., maximum delivery 6200 CFM.

METAL MELTING EQUIPMENT
1—Hausfeld 2000# Aluminum Capacity Furnaces, Barrel Type, Open Flame, Oil Fired
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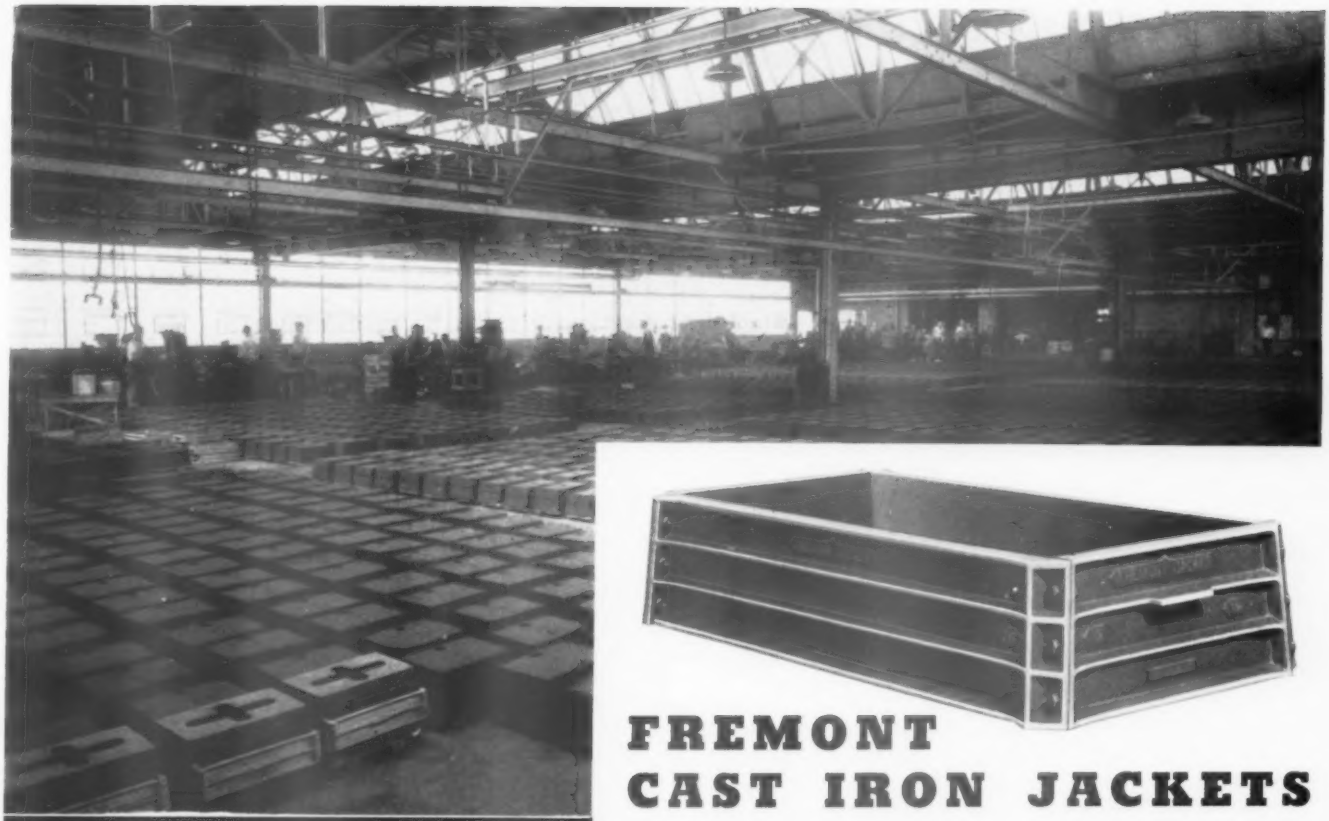

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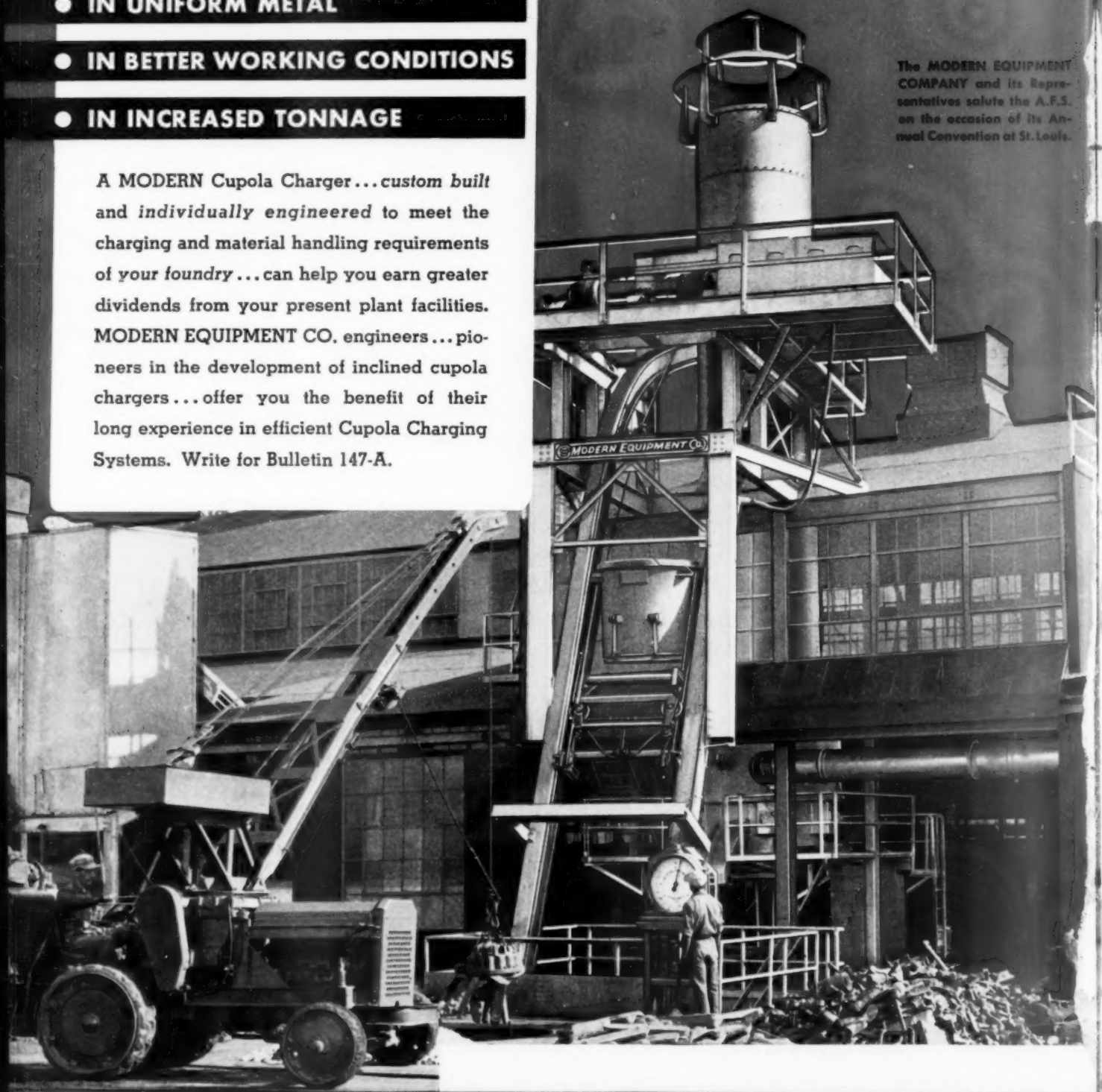


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That's why experienced, responsible foundrymen through the years have come to look upon Stevens as the one dependable source of supply with whom they could concentrate the bulk if not *all* of their foundry equipment and supply purchases. Knowledge born of experience in doing business with Stevens has proved the wisdom of this decision. It's something for you to think about.

One thing you can be sure of, whether it's equipment bearing another maker's name, or a foundry facing material made in our own mill, the superior quality of each product recommended and sold by Stevens is your assurance of utmost efficiency and absolute dependability in that phase of your foundry operation wherever applied.

To call on Stevens is to make *a good connection*. It gives you a direct line to fast action on *all* of your foundry problems. You get the assistance of experienced Stevens field representatives, technicians and foundry production specialists who have but one creed "let's try to do it better for less." Yes, if it's *anything* for a Foundry—Stevens has *everything* you need!

SINCE 1882 STEVENS INCORPORATED FREDERIC B. EVERYTHING FOR A FOUNDRY DETROIT 16 MICHIGAN

LEADING MANUFACTURERS AND DISTRIBUTORS OF FOUNDRY FACINGS, EQUIPMENT AND SUPPLIES

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FOUNDRY EQUIPMENT AND SUPPLIES DIVISION

# 75% Production Increase

*Higher Efficiency*

*Better "Housekeeping"*

*Pleasanter Place to Work*

through

# LINK-BELT MODERNIZATION

Pictures at top of page: molding floor showing molders' individual hoppers; also detail of plow about to scrape prepared sand into hopper. Below: general view showing pouring operation.

**Yes indeed!** Link-Belt modernization is working wonders for the new foundry of Seattle Brass Division, Inland Empire Steel Co., Seattle, Washington, just as it has for many other non-ferrous and ferrous foundries over the country.

This company reports 75% production increase . . . more efficiency in operation . . . a cleaner, more pleasant place to work . . . and other advantages. This foundry features small production runs on castings from a few ounces up to eight pounds. Average production is 6,000 lbs. per day; largely of small plumbing fixtures, ship chandlery and fire fighting equipment.

The sand handling system was designed and installed by Link-Belt. It consists essentially of a troughed belt conveyor handling sand from the shakeouts . . . troughed belt conveyor to sand storage . . . automatic sifter . . . mullers for sand reconditioning . . . conveyor to bucket elevator. The elevator discharges to a distributing belt conveyor fitted with plow plates for serving the molders' sand hoppers.

We'll be glad to give you details of this and other Link-Belt designed sand preparation and distributing systems.

**LINK-BELT COMPANY**

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Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto
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